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Technology Review

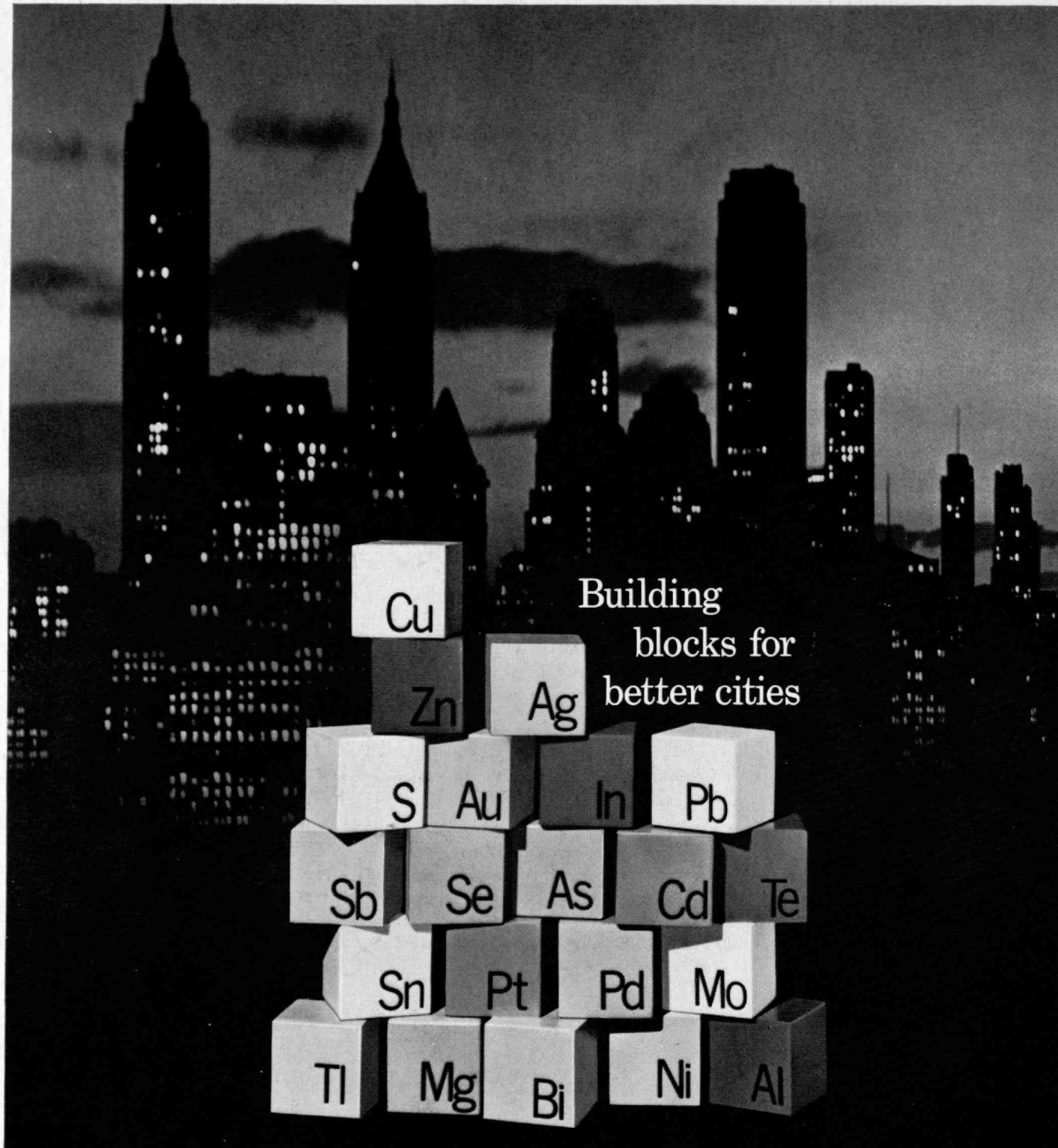
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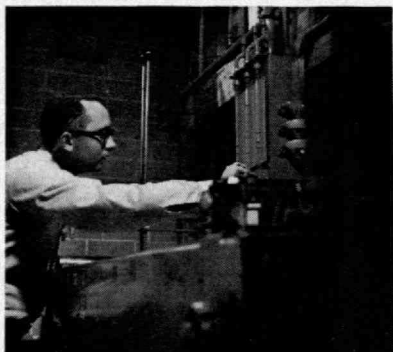
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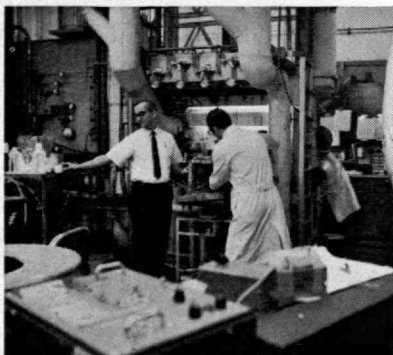
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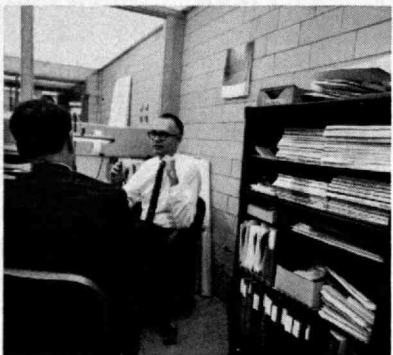
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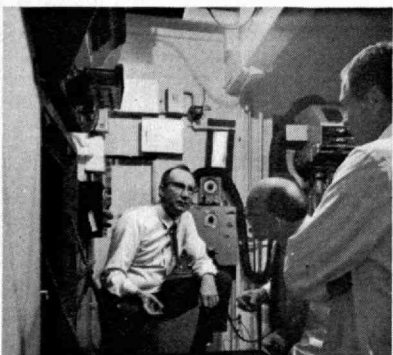
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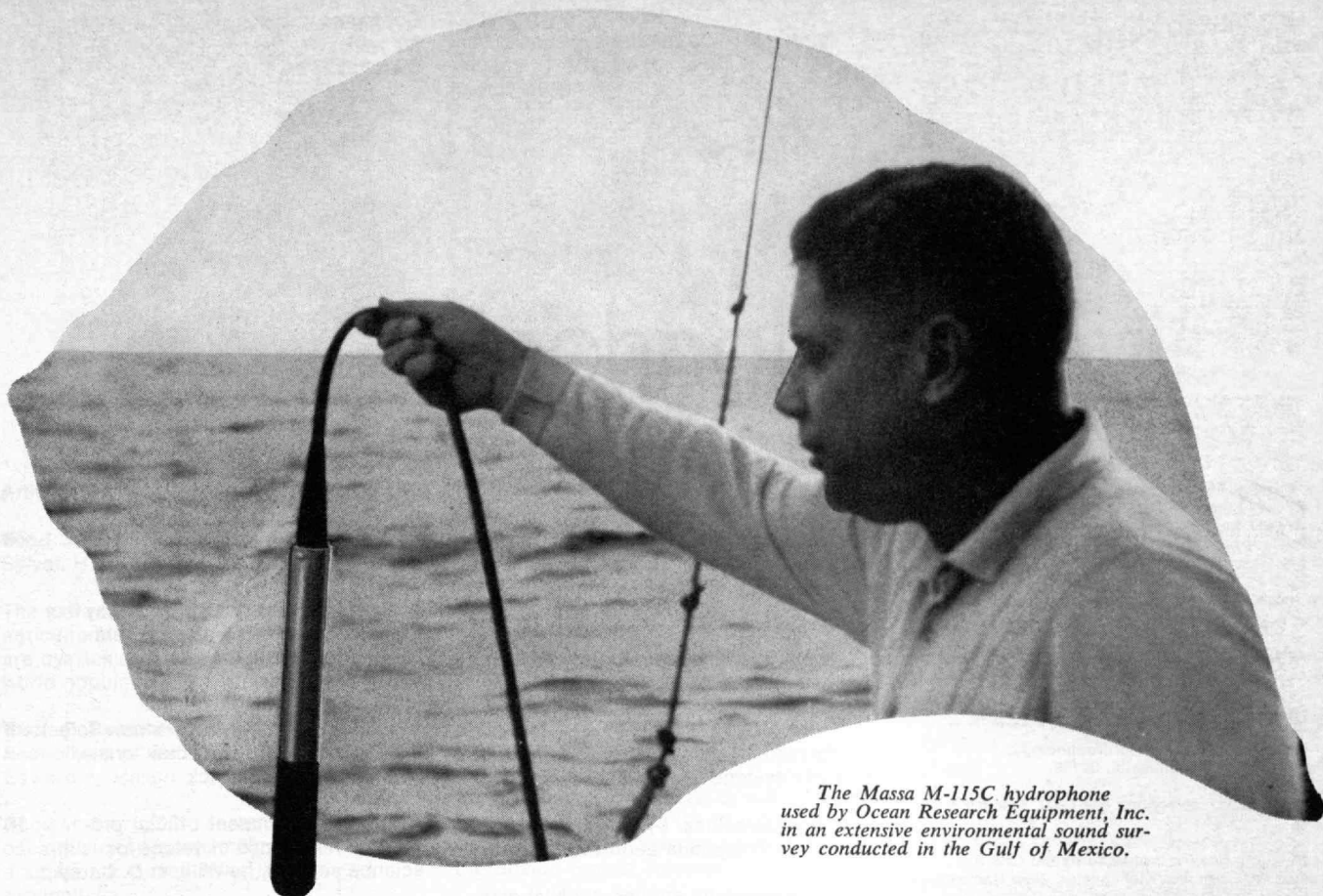
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. . . future social and cultural systems, by Joseph Weizenbaum of the M.I.T. Departments of Electrical Engineering and of Political Science.

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The Real Challenge of Pesticides

As a science writer, I've found it both alarming and reassuring to report studies that show the spread of DDT throughout the world. The comfort comes from a feeling that scientists at least are getting a handle on the dimension of the pesticide menace, and this will spur efforts to control it. So it was a bit of a shock when Francis A. Gunther of the University of California told me some of the indications of DDT's ubiquity may be wrong. He said it to emphasize the inadequacy of the present approach to the pesticide problem.

In many cases, DDT and some other pesticides can be quite dangerous for wildlife. And everyone who looks at their use deplores the accidents and ignorant practices that obviously have killed or threatened birds, animals, and even man. But these things can be controlled. The major concern is over subtle, long-term hazards from poisons that may dilutely permeate our environment. On this point, Dr. Gunther and others who study such contamination at California's famed Citrus Research Center and Agricultural Experiment Station are even more appalled at the ignorance with which the issue is being tackled than at signs of pesticide pollution that have already come to light.

We talked about DDT because it illustrates in several ways the complexities of the issue. The chemical is unquestionably both effective as an insecticide and poisonous to animals. It has been relatively easy to establish its value in crop protection and in public health work. It has been agonizingly difficult to pin down facts about its dangers to animals and men.

For example, while DDT has long been implicated in the decline of certain hawk populations, its role in this has only recently become clear. Within the past year, studies have shown that the poison in small amounts probably changes the calcium metabolism in adult birds so that these birds lay thin-shelled eggs. Relatively few of these eggs survive to produce young.

Another long-term study, recently reported at the University of Maine, shows that even after a single application of

DDT for spruce bud control in forests, small mammals continue to pick up the poison in their bodies for nearly a decade. John B. Dimond and James A. Sherburne, who reported this in the February 1 issue of *Nature*, note: "The extended duration of residue contamination shown in small mammals is a factor which should be considered in decisions on the use of sprays. . . . The cumulative residues resulting from repeated applications would indicate that a threshold can be reached wherein further application of DDT will produce extinction in local populations of certain mammals."

To cite yet another example, Howard Johnson of Michigan State University has shown DDT to be the likely cause of loss of salmon fry in state fish hatcheries. As reported in this column in December, he found the poison concentrating in the egg yolks which sustain the fry. In this way, minute amounts of DDT in the water were concentrated into a lethal dose which the fry received as they consumed the egg yolks.

In contrast to such detailed studies, evidence for DDT as a global menace is fuzzy. Minute traces of it have been found in mid-ocean and Arctic snows. Presumably, because it has been dangerous to hawks or Maine wood voles, its presence anywhere is suspect. Yet do these measurements indicate a ubiquitous and growing environmental hazard, or do they just show how sensitive analytical techniques have become? Or are some of the measurements simply wrong? They are usually made by techniques of gas chromatography at the extreme limit of its sensitivity. Mistakes are easy to make with such measurements. Dr. Gunther pointed out that the chemical aroclor, widely used in such things as automobile tires, would look like DDT. Many measurements showing DDT in remote areas now have to be redone to make sure it was DDT and not aroclor, he said.

Yet reports of such measurements gain headlines and stir emotions as much as do the better founded studies of dangers to wildlife in specific situations. All of this blends together in public thinking to give an impression of a ubiquitous and growing hazard from DDT. And along

with this impression, sentiment to ban the chemical is beginning to appear. Indeed, at this writing the Environmental Defense Fund is pressing for such a ban in Wisconsin before a hearing of the Wisconsin Department of Natural Resources.

Perhaps in an area like Wisconsin, such a ban on DDT might be good policy. DDT's dangers to wildlife, especially to fish, at last are fairly well documented. Wisconsin farmers are wealthy enough and sophisticated enough to shift to other methods of pest control if they have to. But Wisconsin is not the world.

There is no way of controlling insects for general farming and public health purposes as cheap and effective as the use of DDT. This is a very persuasive fact to many countries. For them to abandon DDT now would mean an immediate cost in increased crop failures and less effective control of insect-borne diseases. Under such circumstances, wildlife studies made mostly in advanced Western countries aren't very impressive. And ecologists have yet to make an effective case that there is a build up of DDT in the global environment whose dangers offset the immediate benefits of using the poison.

Dr. Gunther, who has worked with pesticide contamination for many years, thinks that trying to ban use of certain pesticides can be a dangerous delusion. When public interest in the problem is rising, it diverts attention from the basic need for a massive increase in research.

My "comfortable feeling" that scientists are getting a firm grip on the dimensions of pesticide contamination is part of the delusion. After many years of fragmented research, they do know something about dangers to wildlife in using DDT. They suspect, but can't yet prove, that DDT is becoming a universal pollutant. But there's a lot more in the chemical arsenal than DDT.

The United States has something like 30,000 registered pesticide formulations. They represent about 1,000 basic chemicals. Many are herbicides, rodenticides, and the like. Perhaps 40 percent are insecticides. And of these, something like 50 different chemicals get the most use.

They vary in toxicity to animals. Some have short lives. Some last for years. As with DDT, these poisons have usually been quick to find economic niches. Yet we still know little about the long-term environmental hazard of any of them.

Even the techniques of monitoring our environment for these poisons are rudimentary. A working group of Britain's Advisory Committee on Pesticides and Other Toxic Chemicals reported in January that present analytical techniques may be adequate for the research laboratory. But techniques and instruments need to be developed for simple, quick, and routine analysis. Lack of such technology makes it hard to keep an adequate check of poison residues on food, let alone to monitor the general environment.

In the United States, the Midwest Research Institute recently completed a pilot project for the Public Health Service in which technicians monitored the air in several places. The main fruits of the project were development of a monitoring instrument and some indication of what the P.H.S. faces in setting up a meaningful air monitoring program. Reporting this in January, *Chemical and Engineering News* remarked: "There aren't nearly enough data to draw any broad or definitive conclusions . . . But just having some data to go on puts study of atmospheric contamination by pesticides way ahead of where it had been."

The research neglect which such a statement illustrates is what concerns an agricultural chemist like Dr. Gunther. He knows that pesticides, including the hazardous ones such as DDT, have brought benefits in improved crop yields and control of disease-carrying insects. Some of them may also pose grave threats to wildlife and men. But neither experts nor society have the full range of facts needed to weigh the trade offs in this situation.

"You have to avoid generalities and get down to specifics," Dr. Gunther explained. "Now we know that DDT will kill oysters above a certain level of concentration in the water. Knowing this, and knowing how DDT would be used in an oystering community, you can decide

whether or not there is a risk to the oyster beds. And if there is a risk, you can intelligently decide whether the public payoff in using the DDT is worth the killing off of the oyster beds. We need this kind of factual knowledge for all the pesticides in all the ways they are used."

Boysie E. Day, Associate Director of the Experiment Station, feels quite strongly about this. He joined the conversation to point out that governments and the public must face up to the magnitude and complexity of this challenge.

"We have tackled such complex problems in the past," he said. "We organize thousands of experts and spend billions to put men on the moon. We have to be willing to make comparable efforts to deal with a complex situation like pesticide contamination."

"There is no other way out. We simply have to know what we are doing. We have to seek solutions on the basis of facts and not of public emotion. We can't dodge this responsibility by looking for simple solutions. And that's what people are doing when they want just to outlaw a chemical."

"We are beginning to learn what we are doing to our environment," Dr. Gunther observed. "There is a trend to try to use less hazardous chemicals. But in some cases, economics still dictates use of the persistent, more hazardous ones. We can't look just at Wisconsin. We've got to look at the world. We've got to get the knowledge that will let us weigh advantages and consequences."

"And be assured," Dr. Day added, "there will be a cost for every payoff."

Every year's delay in making a truly effective research attack on the contamination problem makes it that much more likely that the environmental costs will get out of hand. Hopefully, rising public concern over the problem will crystallize into strong political pressure for such research. Unless it does, impassioned efforts merely to ban DDT or other specified chemicals would indeed be chimerical.

Robert C. Cowen, who studied meteorology at M.I.T., is Science Editor of The Christian Science Monitor and Past President of the National Association of Science Writers.

A Crisis Facing American Science

In two essays on these and the following pages, Technology Review presents two views of the meaning and effect of reduced federal support for science and technology which has brought concern and controversy to American campuses.

Mrs. Fitzpatrick (article at right), Director of Public Relations for the New York Academy of Sciences, has been closely associated with the Academy's effort to define and publicize the effects of reduced government support of science.

William D. Carey (article on the following pages) was Assistant Director of the Bureau of the Budget until late January. He is now a senior member of Arthur D. Little, Inc. This article is based on his remarks before the 1968 meeting of the Corporation Associates of the American Chemical Society. It is published here by permission of the American Chemical Society and with the cooperation of the author.

On December 23, 1968, The New York Academy of Sciences released its report, *The Crisis Facing American Science*. Four months in the making, it was the result of a "town meeting" by the same name called by the Academy in New York City on June 21, 1968, "to recommend that science be declared a disaster area in light of the impending \$6 billion federal budget cut."

At that meeting, Minoru Tsutsui, then President of the Academy, warned that "the decreasing share of the overall federal budget going to scientific activities and education has created isolated crises in institutions and laboratories for a number of years. Many worthwhile and potentially life-saving projects have been irretrievably destroyed because funds have been cut or withdrawn."

Nobel Laureate Linus Pauling noted that "if these cuts in the budget are made, even if for only one year, scientific research and scientific education will be set back so greatly that the entire economy of the United States . . . will suffer seriously for many years . . ."

Bentley Glass, Academic Vice President of the State University of New York at Stony Brook, suggested that "the right way to consider whether the support of basic science is profitable to the nation is to examine the enterprise in reverse. Look at the great developments in our modern world . . . that make 1968 already more different from 1900 than 1900 was different from the year One."

The meeting was an unprecedented venture into public policy by the 152-year-old Academy whose accustomed role is to provide a line of communication, through conferences and publications, between scientists. And it placed the Academy, as a new champion of scientific research and education, squarely in the middle of a chaotic situation. But the Academy's role is a natural one, says Dr. Irving J. Selikoff, its new President. Academy members represent every field of science, from astronomy to zoology, a total of 26,000 members, 80 per cent in the United States, who may be considered fairly representative of American science. The Academy has no ties with either government or industry.

As this financial situation developed, the Academy was bound to hear the story from all sides. "It became evident that we had to do something, that as a diverse, independent body it was our duty to speak up," he says.

A New Focus for Concern

Out of the June 21 meeting came three major conclusions:

1. Failure to provide adequate support for scientific activities has already resulted in serious setbacks to research and education.
2. The expression of the scientific community's point of view has been late in coming.
3. Immediate first-aid measures must be taken to identify instances where blanket cuts may cause unintended, irreversible damage to important scientific programs.

The Academy was now a focal point for both dissent and solution. By the time ten of its officers and staff were invited to discuss the matter with President Lyndon B. Johnson and Donald J. Hornig, the President's Science Adviser, on July 30, the decision had been made to seek out the specifics in a survey of the country's major academic institutions and research centers, and to make some positive recommendations to help avert the crisis.

A large and eminent group, designated the Ad Hoc Committee for Evaluation of Federal Support of Science and chaired by Minoru Tsutsui, was given the job of carrying out the survey and drafting the report to the Administration and Congress.

The report was written quickly. "The need for rapid information simply overrode meticulousness of design," explains Dr. Selikoff. "We were unhappy to find how little 'hard' information there was to work with in this whole area. We started our investigation with the feeling that a representative sample of major universities would at least give an indication of the direction and dimensions of the problem. I think the relative unanimity of the replies to our survey—by deans, presidents, and individual investigators—did indicate that for a very large segment of the educational community the problem is very

much as we reported it. I think that part of the value of the report, perhaps its greatest value, has been to give voice to the thoughts of many scientists throughout the country. This is not an unimportant duty of the Academy."

Detailing information from the deans and presidents of schools and from individual investigators, the report illustrates six major findings:

1. American scientists and institutions of higher learning have been encouraged to depend heavily on federal grants as part of their normal operating expenditures. Current and anticipated federal reductions require cutbacks in individual programs that range from the inconvenient to the catastrophic.
2. The effects of the scientific spending cutbacks are being felt particularly by those persons, institutions, and programs that are not well established.
3. Cutbacks are leading to the loss of substantial investments already made by the federal government and others. New schools, hospitals, and research centers are not being fully utilized, research that is now reaching a fruitful stage will have to be discontinued, and experienced research teams are being disbanded with consequent permanent losses of important capabilities.
4. The future supply of scientists is being adversely affected.
5. The pressing needs of our society, in many crucial areas, are failing to receive the scientific attention they deserve. Potential solutions to such problems as poverty, racial discrimination, population control, air and water pollution, cancer and cardiovascular disease, mental illness, mass transportation, housing and education are not being pursued because of the lack of continuing support.
6. As a result of all these factors, morale in the scientific community is low.

Short- and Long-Range Proposals

The Committee made recommendations for "a few necessary first steps toward meeting the immediate crisis and setting the stage for establishment of a long-range federal science policy that will obviate future crises."

First, "the federal government should take short-term corrective action to off-

set the critical short-term effects of the cutbacks." The Committee sees the goal of such action to be the alleviation of three very specific problem areas: the training of scientific manpower to preclude a serious shortage in the near future; the continuation of support of ongoing projects of merit; and the granting of funds to programs involving new concepts and ideas. The Committee made qualified but definite recommendations regarding temporary sources of funds, the immediate palliative if not the final answer.

And the Committee proposed that these diverted funds reach the places they are most needed through increased institutional grants specifically earmarked for manpower training, meritorious projects, and new programs.

The Committee's second major recommendation is establishment of an annual growth rate of 15 per cent for federal spending on scientific research. While noting that "such a policy . . . must be founded on our perception that existing programs do not now use available scientific knowledge and manpower to their fullest extent," the committee's advocacy of the 15 per cent growth rate was based on the fact that, rising costs considered, it would represent only a 4.8 per cent yearly increase in the employment of scientific manpower. If, on the other hand, research and development expenditures remain constant, a shortage of 29,000 scientists would develop in one year, widening to 116,000, or 18 per cent, in four.

Two additional suggestions were made but not discussed: improved methods of consultation and communication should be established between the federal government and the scientific community; and the federal scientific research budget should be made on a long-term multi-year basis.

The report was well received. In a letter dated December 24, Lee A. DuBridge, President Nixon's science adviser, wrote Dr. Tsutsui: "I assure you I am very glad to have this report and I shall give it very careful attention as I assume my new duties in Washington. I am sure my views are very similar to

the ones that you set forth in this document and I hope very much that I can find a way to do something which will alleviate this crisis." Dr. Hornig wrote on January 16 to say that "the considerations brought out in your report have been taken into account in preparing the budget which the President has submitted to Congress."

Toward Continuing Evaluations

The report raises a number of questions. And it is called "preliminary." Obviously the Academy's Ad Hoc Committee for Evaluation of Federal Support of Science plans to continue its work. Dr. Selikoff believes that the "key sentence in the report appears in the recommendation of the 15 per cent growth factor—that existing programs do not now use available scientific knowledge and manpower to their fullest extent. In part, this is because we—individual investigators, industry, major health organizations, government—have never had a master plan. In fact, with very few exceptions, no one scientific field has ever really planned for its future," says Dr. Selikoff.

Many questions must be answered—and asked—before projections can be made. What shall we allocate to basic research, to mission-oriented research? How many scientists or engineers or technicians have we on hand now and how many, and what kind, will we need in ten years? How are we to evaluate quantitative changes and requirements?

In its effort to respond to questions such as these, says Dr. Selikoff, the Academy is developing staff resources to be concerned with the development of a research plan and approach. E. Cuyler Hammond heads a group at the Academy which will study the feasibility and applicability of various research designs. "We will, of course, cooperate with other groups working in the same field. We will also carry out an expanded program of public information. We hope, too, to be able to assist the Administration and Congress, and we hope that our advice will be sought," Dr. Selikoff says.

Toward the Proper Study of Man

Five years ago I suggested to a comfortable and disbelieving gathering of scientists and research managers that if they looked carefully they might detect early signs that the heady growth of federal investment in research and development would be succeeded by a period of slowdown and then a leveling off. And I proposed to them that the justification for the sixteenth and seventeenth billions would have to be very different from what sufficed for the first billion.

I recall that speech not in the spirit of parading the accuracy of my hunches but to make the point that any category of government investment, including research and development, cannot be taken for granted. Public preferences change, priorities shift, and new needs press hard on the incremental budget dollar.

I am well aware of the consternation that has followed the leveling off in federal research and development funding. We are in a holding pattern that is probably going to last for a while. Barring the emergence of some new national imperative comparable to the cold war motivation of the 1950's or the man-in-space commitment of the 1960's, government investment in research and development is not likely to resume its earlier angle of climb. But holding the lid on research and development for a prolonged period with no growth at all suggests a number of serious results: that we are not addressing our full potential for creative basic research, that we are under-utilizing our technological capability, and—most important—that we have formulated neither a national policy nor a workable strategy for the uses of science and technology as expressions of our culture and our power.

No one doubts the momentum of creativity in American science, but this does not necessarily testify to the existence of any social value that we attach to science as a public good. I am reminded repeatedly these days of Thomas Huxley's remark of 100 years ago after he took his first look at America. He said, "I am not impressed by your bigness. Size isn't grandeur, and territory doesn't make a nation. The great question is: what are you going to do with it

all?" And that is the question we have still to answer in the context of research and development. What are we going to do with it? Inspect the outer universe, or the inner city? Discover new atomic particles, or new routes to human understanding? Build better accelerators, or better neighborhoods? Probe the deep oceans, or the causes of violence? Spend much on learning to prolong life, and almost nothing on learning to use life? Shall we do all these things, or other things, or none of them?

The Values We Choose

If you think government has the answers, let me tell it like it is. Government cannot force science on society nor invent values for society. A president can measure the state of the Union and set his administration's goals, and sometimes the country will follow him for a while. But an open society, with a plurality of conflicting preferences, in the end outlasts presidents and charts its own course. And if public policies are to be durable and survive the rigors of changing times, they must grow out of deeply held beliefs and values of the society, rather than from its transient impulses. So with public policy toward science. If it is to be strong, it must first be relevant and it must be shown to have relevance.

If research and development are necessary prerequisites of acceptable national security, or of better health care, or of efficient transportation, or of safer airways, or of getting the mail delivered, or of the control of crime and violence, or of the enrichment of education and learning, and if these are the central concerns of our society, then science and its advocates must learn to shape research and development accordingly and give it relevance in these terms. I suggest that here we find the source of today's support gap.

In a very real sense, the federal government is at the point where very tough policy choices must be made about research and development:

In the area of academic science, we have to decide whether the prospects for research support are bullish enough to justify encouraging the production of

more scientists and the development of more high-grade institutions. (Plainly, government should not have contradictory strategies for scientific manpower and institutional development, on the one hand, and for research support, on the other.)

In the area of research on energy sources, we have an unbalanced policy that sees 85 per cent of government support directed to nuclear power while very little goes into the reduction of pollution by sulfur oxides, into processes for converting coal into oil or gas, or into finding ways to cut the cost of underground electric transmission. Presumably, the federal government's responsibility should be limited to research and development on those things that industry does not have an economic incentive to take on; but this is not clearly spelled out, and it does not solve the question of government's responsibility in matters of technological opportunity—which is a hard issue to decide when it confronts you in military, space, aviation, nuclear, and biomedical contexts.

We are criticized because one-third of the money for foreign affairs studies and research comes out of the Defense Department, yet we see little likelihood that equivalent dollars would be in fact appropriated to the State Department or to the National Science Foundation.

What, then, should be our policy toward financing civilian technology? As of now, we go in or stay out on a case-by-case basis, taking on the supersonic transport, oil shale, fast trains, and breeder reactors but putting on the waiting list such candidates as high-speed tunneling systems, intermodal transportation, housing technology, non-conventional automobile power, weather modification, and the artificial heart—in short, a vast field of action for industrial research and development.

And finally there is the prodigious issue of the strategy for the space program over the next six to eight years—whether and in what way to make the decisions on post-Apollo manned flight, whether to put limits on technological opportunities, or whether to simply hold

things in a steady state to allow the options to be re-examined in another budget cycle and by other people.

So in many ways this is an important year for science and technology. Our opportunities are sadly out of phase with our pocketbook, and it would be hard to think of another area of public action where the problems of choice confronting the government are more baffling. Is it right, in the sense of good social policy, to underfund programs in education, environmental health, and Model Cities so that we can seize our opportunities in science and technology? Should we require that public investments in research and development meet some reasonable test of social return commensurate with the cost of investment and equal to or higher than the return on different uses of the same money and creativity?

I am one who thinks we should. I feel that it is not good enough in a rational but troubled age to run a country on the double standard of prudence in private investment and simple incrementalism in public investment. This is precisely why for the past few years we have been working at top speed to change and upgrade the government's decision-making process and to inject better methods into the way government works out problems of choice and makes up its mind what to do next. And I see no reason why research and development should have immunity from all this.

Problems of the Plateau

For the short run, it is going to be very hard to persuade the country and the Congress that research and development are being maintained at a poverty level. Nor do I think much sympathy can be stirred up by general level-of-effort arguments pitched to the flattening out of the support curve, because I have never met anyone who could prove or disprove that we are spending "enough" or "too much" on research and development. But you can start an argument with no trouble at all if the question is whether to put the next increment of money into funding big science or little science, into the universities for undifferentiated basic research or into targeted biomedical applications, into

high-energy physics or into microbiology or research in human reproduction. You can find even louder arguments over transfers between science and non-science investments—space research contrasted with improving ghetto schools. The tighter the budget, the sharper the disagreements.

Things being as they are, we would like to see industry lend a more generous hand in shoring up basic research, because this is not just the province of the federal government. It is somewhat painful to observe that in 1966 the universities carried out basic research costing \$1.7 billion for which industry provided only \$27 million while government provided \$1.1 billion. If industry appears to think that the cost of basic science in the universities is not worth sharing beyond a bare two tenths of one per cent, I am not surprised that Congress thinks its track record is pretty good and does not need improving.

The likelihood of a fiscal miracle happening to extricate research and development from its present plateau is remote. I certainly am not about to put words into the mouth of the new administration. But I see almost no possibility of providing for significant new programs unless existing programs are cut back. Looking ahead as far as 1974—a five-year span—built-in increases alone are likely to drive up outlays by as much as \$40 billion, which plainly limits the resource base that is available for future decisions. As things now stand, only about 23 per cent of annual budget outlays meet the definition of controllability. These are some of the realities that we need to face.

Needed: A New Source of Decisions

But if more money is going to be scarce for research and development, we may be able to correct some of the deficiencies in the way government deals with these matters. If our policies and strategies for science and technology are hard to fathom, perhaps it is because we are not well organized. Research and development are decentralized through the federal government, managed as a network held together loosely by the White House science office. There is no prime mover; the decision-making pat-

terns are pluralistic. As an institutional process science and technology are not responsive to standards of balance, purpose, or priorities. The component elements serve as mission-related conduits for funding research, development, training, and academic science; they do not function as a system because there was not a system to begin with.

We need something better, something capable of shaping science goals and strategies with depth and range and visibility. We need answers; we already know the questions. What I visualize is a center for examining the interaction of science with higher education, social change, international cooperation, technological development, and economic growth. It would be a center to examine the mix of national investment in science and technology, to assess the quality and social returns of the investment, to identify opportunities and imbalances, to formulate models for investment that are addressed rationally to the variety of needs that we face—in short, to make a start toward indicative planning of the uses of science and technology.

I think we need better perspectives. In the last ten years, our national investment in research and development amounted to \$185 billion; more than three-quarters of it came from federal funds, and the bulk of it went to defense, space, atomic energy, and medical research. But consider the shape we are in today: strong militarily, strong technologically, approaching a trillion-dollar gross national product—but torn apart socially, moving from one crisis to another, humiliated by violence and disorder, and confronted by uncertainties. For all the explosion of knowledge, for all the creativity, for all the breakthroughs, is it possible, after all, that we were asking the wrong questions?

There may be something to the notion that the proper study of mankind is man, and perhaps we should have been studying him more diligently. Do we know enough about him, for example, to be certain that—getting back to Huxley—he does know what he is going to do with all these things—the wealth, the abundance, the power of our society?

Czechoslovak Science Under Stress

When Soviet Union troops arrived in Prague on the early morning of August 21, they did not find there the American tanks they were made to expect by their press. But they trapped in Prague some 4,000 foreign scientists, many of them from the West, who were taking part in the International Geological Congress. (Prague has become a favorite meeting place for international conventions of this sort in recent years, not only because the city is so attractive to tourists and so hospitable, but also because Czechoslovak scientists were more knowledgeable than any others in Eastern Europe about Western developments and not at all inhibited in developing real international exchanges and co-operation.) And as I watched the convoys of foreign cars meandering between Soviet tanks towards the Western frontier during the days that followed, I realized that many Czech scientists would follow soon if they had the chance. The Czech frontier surprisingly remained open until the end of November, and this migration actually took place. Of the 40,000 to 50,000 Czechoslovaks who have chosen not to live under the Russian occupation, a very large proportion are intellectuals. About 10,000 students left the country, according to the Czechoslovak Minister of Education, Professor V. Kadlec. He said that a list of their teachers who left the country would not be too long, but that the loss of research institutes' personnel is much more serious.

(It can be argued that unlike the health service, which is seriously threatened by the mass exodus of doctors, the research institutes should be able to make good their losses in a relatively short time. Not so long ago the director of one of the largest Czechoslovak research institutes complained to me that he had no vacancies in his institute for talented students he would like to take in. This was because the research workers trained in his institute were not being absorbed by industry, he said, and so they remained to occupy the places which were thus unavailable to students. The blind alley situation in Czechoslovak research institutions is therefore likely to prove, in the long run, a more serious impediment to the development of scientific work than the defection of a few thousand research workers.)

Why should these researchers make the difficult decision to emigrate without a return ticket? To answer that question requires a description of the situation of Czechoslovak science.

When the Soviet Army arrived in Prague, only a tiny proportion of the Czech intellectuals felt in danger politically in the narrow sense of the word—that is, by persecution because of a public stand they took in support of the liberal regime of Alexander Dubcek after January of last year. The overwhelming majority left the country simply because their hopes were dashed; they saw no possibility of a change in the social and economic climate towards a greater appreciation of the work of the scientists. In spite of all the protestations that socialism is a scientific way of ordering the life of society, the bitter truth brought home to them in the course of the last 20 years was that an industry organized according to Stalinist doctrines cannot make any great use of the results of science and research and that, accordingly, the social status and the pay of the scientist are inevitably very low.

Czechoslovak scientists have done fairly well in biology and chemistry and in certain departments of physics, and Czechoslovak medical workers and pharmacologists have contributed to the advance of their disciplines. But the progress in those branches of research which can only be realized through industrial application has not been satisfactory. Most workers in these fields have felt frustrated for years.

The resistance of industry to innovation, natural to a certain degree in the European context, reached extraordinary proportions in Czechoslovakia because of the continued existence of a seller's market and because of the way economic controls operate. Until 1967 it was the general practice to pay bonuses to workers and managers only if the planned quantity of output was reached, irrespective of quality and sales or profits. In 1967 this bonus plan was replaced by a system of rewards which depended upon the gross income of the enterprise. Thus innovation proposed from a research institute became undesirable because it would in all proba-

bility upset working habits, and innovations were positively dangerous if their introduction would cause a temporary reduction in output.

The Mutilation of University Life

The other major cause of disenchantment was the doctrinaire approach to knowledge. Looking back, with the advantage of knowing all that happened afterwards, one can see that the 1950 university law enacted in Czechoslovakia, the aim of which seemed almost incomprehensible at that time, was in fact based on the assumption that there is a well-defined body of knowledge in all fields of human endeavor, on which future research can alter nothing. This law almost entirely ignored scientific research, and it viewed universities as purely teaching establishments. As a result, Czechoslovak scientists, reporting the more bizarre communications of Professor Lisenko and Professor Lepeshinska, often managed to add a footnote that it was impossible to verify these results in the Czechoslovak research institutes "owing to the shortcomings of their equipment." But they were in fact prevented from making an active approach to all problems in the politically sensitive fields; these included not only genetics and economic theory but also the application of mathematical machines to industrial processes and applications of analytical psychology in medicine and industry. (Professor Norbert Wiener's work was under a Moscow-imposed embargo until 1966; now his *I Am a Mathematician*, translated by my wife, Zdenka Hermann, is to be published shortly in Prague.)

The severe mutilation of university life caused still greater damage to scientific progress. Because of their separation from research opportunities, university teachers were being left behind the times; they had no opportunity to train their students in modern methods of research and in creative scientific thinking. Instead, they were obliged by the government-imposed curricula to cram their students' heads with facts and to give examinations requiring prodigious feats of memory.

The Academy of Sciences

The research groups removed in 1950

from the universities were combined with existing industrial research units into the first research institutes, and in 1952 these were placed under the direction of the newly created Czechoslovak Academy of Sciences, based on the old scientific organizations of the western part of the country—the learned societies and the Private Society of Sciences, transformed in 1874 into the Royal Bohemian Society of Sciences. But the new Academy profited very little from this tradition; instead of providing a forum for creative minds, which was the main function of its predecessors, the reformed Academy of Sciences agreed to act on the model of the Soviet Academy of Sciences as the government's agent and overseer of science life. Its central organs became all-important in the administrative apparatus of the Academy, and to add to its pay and prestige the Academy multiplied within a short time the number of institutes and laboratories and research stations working under its control.

Between 1955 and 1960, in five years only, the number of institutes and laboratories increased four times, but the number of workers employed in them only doubled. It is understandable that as the units grew in number and decreased in size, the ratio of scientists to auxiliary workers diminished. As a result, the research and development network produced in this way had a tendency to mark time by repeating experiments done elsewhere instead of doing original research. This program had another advantage, too: one knew in advance what the probable results would be, and this knowledge made it possible to avoid rebuke for lost time in conducting research which led to no practical results. This had special relevance because tangible results of practical value were another obligation imposed by bureaucrats who, on the whole, were little educated and therefore had difficulties accepting the unpredictability of a truly original scientific effort.

The Return of Scientific Creativity

It would be wrong, however, to conclude that nothing has been done and nothing achieved in Czechoslovakia since World War II. For party control of science began to relax by about 1964, and in fields where important work had been done in the past, traditions began to reassert themselves and new, strong personalities appeared. Contacts with Western scientists became more numerous, and Czechoslovak scientists began to make important contributions, especially in the fields of biochemistry, chemistry, biology, astronomy and solid-state physics. They found themselves freed of most constraints to fundamental research.

As the embargo was lifted off cybernetics, for example, Czech mathematicians turned with eager interest to the theory of information and mathematical logic, and they could claim rapid advance in the development of computation methods. In solid-state physics, interesting results were obtained in the investigation

of ferromagnetic materials. The polarographic methods originally invented by Professor Jaroslav Heyrovsky, the only Czech Nobel Prize winner, were further developed in an institute bearing his name.

Important results were obtained in the field of macromolecular chemistry, some of which found application in the United States sooner than in Czechoslovakia. And in tribute to this work, Professor Ota Wichterle, founder and director of the Macromolecular Institute in Prague, was elected the first President of the Division of Macromolecular Chemistry of the International Chemical Union.

Czechoslovak astronomers contributed particularly to the knowledge of solar radiation and perturbations.

Much useful work was done in the fields of parasitology and of biological insecticides—in particular in the continuous cultivation of bacteriological insecticides.

A substantial effort made in the field of geology, primarily concerned with the formation of superficial and lower layers of the earth's crust, won recognition when the International Geological Congress elected to hold the meeting in Prague mentioned at the beginning of this contribution.

Important as these results are in themselves, they appear to be rather isolated in the overall context of Czechoslovak scientific life. Many more opportunities were lost. Many believed that these losses were caused by the insistence that both natural and social sciences be based on materialistic philosophical premises and that their fundamental method must be that of dialectics and historical materialism. Such an approach need not in itself prove an obstacle and may even be useful to an educated and liberal mind. But the dogmatic insistence on revealed truths, particularly in biology, did retard scientific advance and, for example, had tangibly adverse effects on agriculture. Still more general was the adverse influence of people engaged in planning science and research. With petty bureaucratic minds, these people not only delayed the application of research results in industry but tended to obstruct the very process of discovery and research because of the risk which seemed to them involved in work, the results of which could neither be predicted nor properly accounted for in quantitative expressions. Thus they deprived science of any element of surprise and discovery.

Industrial Planning and Industrial Science

The lack of understanding in top planners led to a deterioration of the entire machinery of planning at all levels. If there ever was a perfect example of "Injelijitis," the disease of organizations caused by a combination of incompetence and jealousy, as described by Professor Northcote C. Parkinson, the Czechoslovak science planning ma-

chinery provides it. There were simply too many administrators telling the scientist and researcher what to discover.

Few outside observers realize that though Czechoslovakia's was always considered a planned economy, it never had a long-term economic plan. So there was nothing on which to base targets for applied research. It is estimated that 70 per cent of all the known branches of manufacturing industry exist in Czechoslovakia. To illustrate the incompetence of science planning, it will be sufficient to say that at one point in the middle 1950's the science planners hoped to provide all the research needed by this very wide range of industry within institutions representing less than 1 per cent of the world's research capacity.

The fragmentation of forces in the institutes of the Academy, resulting in small teams poorly equipped and constantly changing from one project to another, was still worse in the network of state research and development institutes and much, much worse in the research establishments of industry. Those research workers who attacked practical problems with enthusiasm gradually left this field for purely theoretical research where they could at least take pride in the publication of their results. They were discouraged from remaining in the applied research institutes by the fact that most of the results which they achieved were not applied in practice, and they saw little prospect of any application in the foreseeable future.

For some time, Czechoslovak scientists and researchers entertained the hope that the limitations imposed by the small capacity and small market at home could be partly overcome by joining forces with their colleagues in the other Communist countries of East Europe. There were, of course, suspicions and national jealousies. The free exchange of results was disadvantageous to the side which had the more powerful contribution to make, and this, in many cases, was the Czechoslovak side. But it was hoped that gradually a system of sponsored research could be developed throughout the Communist bloc which would make possible joint research and development projects sharing results and costs equitably among all participants. In theory, this is still the policy underwritten by all the governments of East Europe. But scientific work, as all creative work, is more susceptible to psychological hazards than any other, and the trauma of occupation is not likely to benefit co-operation in the field of science and research in the Communist camp.

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Grandeur is for Politics, not Technology

Paris—The French population is almost exactly one-quarter that of the United States, her gross national product is only about one-seventh as large, and her total annual expenditure for research and development is only about one-tenth that of the U.S. Nevertheless, as a matter of deliberate political choice, France has selected one of the costliest and most uncertain fields of activity—big technology—to support her claim to a place among the world's significant powers. Behind this decision is a desire for independence, and crucial to the strategy of independence is an effort to maintain at least a "presence" in every important field of science and technology.

One measure of French determination in this regard is to be seen in the treatment accorded science and technology in the severe budget cutting that has taken place as a consequence of last spring's political and economic upheavals. Whereas most government activities were harshly treated as part of the effort to cut the deficit and thus avoid devaluation of the franc, science and technology came out relatively well. The economic crisis did bring an end to four or five years of extremely rapid budgetary growth, but virtually all fields emerged with at least as much as before, and in many instances there were moderate increases. There was no slackening in a newly begun program to develop a major oceanographic effort, and—though plans were dropped for a new national high-energy accelerator and certain projects were stretched out in time to reduce spending—French scientific leaders generally feel that they have little to complain of.

Still another indication of the central place that science and technology occupy in French political thinking is to be found in the sizeable increase that has taken place in recent years in the number of science attaches posted to French embassies and also in the number of Foreign Office personnel who have been assigned to the various government councils that deal with scientific and technical affairs. Precise figures are not obtainable, but by all accounts the movement has been a significant one.

A Success—and Some Liabilities

Since even the United States has been

finding that its own economy cannot easily support the pursuit of every interesting technological possibility, what can be said of France's efforts to gain a position in the big leagues of international technology? The answer is that, in terms of making herself noticed on the world scene, France has achieved one major success, and this is in the fruits of her enormously costly development of an independent nuclear force. Whether or not it makes strategic sense, the *force de frappe* is impossible to ignore. But in terms of developing her scientific and technical resources so that they can contribute to the nation's economic well being, the quest for technological independence is apparently turning out to be more of a liability than an asset.

In certain fields, France has adopted the policy of seeking international cooperation when the costs are too high for her alone. Thus, she has long been a faithful supporter of Europe's high-energy physics organization, CERN. And France and Britain are sharing the costs of developing the supersonic Concorde (see *Technology Review for February*, pp. 10-11). But the French quest for nuclear independence has led her to undercut Euratom, the Common Market nuclear development agency, with the result that costs that might have been shared among the six member nations fall fully upon France's own nuclear budget. In an attempt to become self-sufficient in computer production, France has invested heavily—relative to her own resources—in the *Plan Calcul*, but the threshold for computer development is so high that so far the effort has been fruitless. In space research, another area of great ambition, France has consistently given support to European-wide efforts to develop a launcher capability as well as a space research organization. But at the same time her desire to head off a U.S. monopoly in space communications had led her into a sizeable Franco-German effort to develop a communications satellite system.

The Realities of Spreading Too Thin

These attempts, on both a national and international basis, to press forward in all fields of technology are apparently gratifying to those who are concerned with the image that France presents to the outside world. But the internal realities are in-

creasingly a matter of concern among those who are familiar with the problems that French industry is encountering in worldwide competition. With her research and development resources spread thin in pursuit of at least a "presence," relatively little research is directed toward the mundane but competitively vital technologies that underlie much of the industrial success of the United States, West Germany, and Japan. Furthermore, while big technology, with its traditional appeal to prestige-conscious politicians, has fared quite well in competition for funds, basic science, though far better off than in past years, is nevertheless in a relatively poor position. France went without a Nobel Prize from 1935 until 1965, when the award was shared by Lwoff, Jacob and Monod of the Pasteur Institute. It turned out that a good deal of their work was supported by the U.S. National Institutes of Health. N.I.H., which was then fighting congressional attacks on its overseas expenditures, happily cited the award as evidence of good value received. But French scientists tended to look upon the situation as an indictment of the shortsightedness of their own government.

At present, there is at least rhetorical evidence to suggest that the French government has become aware of the liabilities that are inherent in policies that give overriding importance to the achievement of technological independence. Late last year, Science Minister Robert Galley announced that increased emphasis would be placed on research aimed at producing an industrial payoff. Science ministers frequently sound this theme. (It is, of course, not unknown in the United States, where N.A.S.A. and other advanced-technology government agencies regularly proclaim they are going to do good by industry.) Whether France will succeed in this quest remains to be seen. But it is already clear that when it comes to big technology, "grandeur" may be good for politics, but is not necessarily good for paying one's way in a technologically competitive world.

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New from the M. I. T. Community

Light?—*Photographs from an Exhibition on a Theme*, Minor White, Visiting Professor of Photography, M.I.T., Editor. Cambridge: M.I.T. Press edition of an Aperture Book. The catalog of an exhibition of the same title arranged by Professor White and shown in the Hayden Gallery, M.I.T., in the fall of 1968, to which have been added notes on previous exhibitions in the series, the teaching of creative photography at M.I.T., and the attitude of the photographer in contributing to a collection such as that included.

Measurement Engineering—Volume I: Basic Principles (Fifth Edition), Peter K. Stein (M.I.T. '49), Professor of Engineering, Arizona State University. Phoenix, Ariz.: Stein Engineering Services, Inc., \$13.00. A textbook on fundamental aspects of measurement engineering and their laboratory and industrial applications.

The Company of Children, Barry B. Spacks, Visiting Associate Professor of Literature, M.I.T. New York: Doubleday and Company, Inc., \$3.95. A first collection of poems in which "a young poet celebrates the beauties, fears and hopes of ordinary life—life made rich and strange through the power of imagination."

Electrophoretic and Dielectrophoretic Deposition, edited by Harold F. Pohl (M.I.T. '54) and W. A. Pickard. New York: The Electrochemical Society, \$9.

High Temperature Nuclear Fuels, edited by A. N. Holden. New York, London and Paris: Gordon and Breach, \$31.50. Proceedings of a symposium sponsored by the Nuclear Metallurgy Committee of the Institute of Metals, American Institute of Mining, Metallurgical and Petroleum Engineers at Delavan, Wisconsin, in October, 1966. Among authors are J. A. Christensen (M.I.T. '65), J. E. May (M.I.T. '47), and R. E. Skavdahl (M.I.T. '56).

Collected Works of Count Rumford—Volume 2: Practical Applications of Heat, edited by Sanborn C. Brown, Associate Dean of the M.I.T. Graduate School. Cambridge: Harvard University Press, \$10. Benjamin Thompson's studies on the propagation of heat in liquids and chim-

ney fireplaces, the management of fire and the economy of fuel.

A Source Book in Mathematics, 1200-1800, edited by Dirk J. Struik, Professor of Mathematics, Emeritus, M.I.T. Cambridge: Harvard University Press, \$11.95. Seventy-five excerpts from the writings of Western mathematicians, annotated with introductory comments and footnotes, intended for historians of science and mathematicians concerned with the origins of their subject.

Particle Accelerators—A Brief History, by M. Stanley Livingston, Professor of Physics, M.I.T. Cambridge: Harvard University Press, \$6.95. The origin, development, and importance of many types of accelerators in high-energy physics experiments and in industrial applications.

The Techniques of Springboard Diving, Charles Batterman, Associate Professor of Physical Education, M.I.T. Cambridge and London: The M.I.T. Press, \$5.95. The first book on diving to progress beyond the beginner's stage, this volume is also unique for its basis in the science of mechanics and for its illustrations—frames from stroboscopic movie action photographs shot at 1/100,000 second.

The Freeway in the City: Principles of Planning and Design. Washington: U.S. Government Printing Office, \$3. A report of the Urban Advisers to the Federal Highway Administrator (including Matthew L. Rockwell, '37) on ways in which urban freeways and the process for the development may be improved.

Recent Research on Cast Iron, Harish D. Merchant, Editor. New York: Gordon and Breach, \$51. The cast iron industry has traditionally refused or has been unable to support basic research. The 24 papers in this collection are partial results of the last decade's work, focusing on better understanding of solidification, structure, and behavior. Among the authors are Mats H. Hillert, Sc.D. '56, Isaac Minkoff, Sc.D. '57, and Moshe Oron, Sc.D. '66.

Industrial Logistics, John F. Magee, '51. New York: McGraw Hill Publishing

Company, \$11.50. A survey of industrial logistics, showing how to analyze and improve an organization's logistic system and how to reduce the costs of physical distribution.

The Spirit of Chinese Politics—A Psycho-cultural Study of the Authority Crisis in Political Development, Lucian W. Pye, Professor of Political Science, M.I.T. Cambridge and London: The M.I.T. Press, \$2.95 (paper). A study of the unique national and personality traits that have inspired and shaped Chinese political culture from the time of the Manchus to the present.

New Communities: One Alternative—A Harvard Study of a New City. Cambridge: New Communities Project, Graduate School of Design, Harvard University. A design program to study the physical and social aspects of a compact, moderate-income, new community within the bounds of a metropolitan region. Participants and advisers in the project included George J. Pillorge, '60, Director; Daniel Brand, '58, and Neal B. Mitchell, S.M. '59, Advisers; and Robert H. Armsby, '62, and D. Gordon Bagby, M.C.P. '66, Research Assistants.

Conversational Computers William D. Orr, Editor. New York, London and Sydney: John Wiley & Sons, Inc. A collection of essays on the vision, practice, and implications of the "conversational" interaction with computers which modern technology now makes possible. Includes chapters by Joseph C. R. Licklider, Professor of Electrical Engineering at M.I.T. ("Man-Computer Symbiosis"); Vannevar Bush, Eng. D. '16, Honorary Chairman of the M.I.T. Corporation ("As We May Think"); and Joseph J. Gal, '58, Vice President of White, Weld & Company, Inc. ("Man-Machine Interactive Systems and Their Application to Financial Analysis").

Voltaire: A Collection of Critical Essays, edited by William F. Bottiglia, Head of the Department of Modern Languages and Linguistics, M.I.T. New York: Prentice Hall, Inc., paperback \$1.95, hard cover \$4.95. An annotated compendium of commentary on Voltaire's brilliant contributions in theology, philosophy, literature, and political reform.

Francis Bitter:

Selected Papers and Commentaries
edited by Thomas Erber and
Clarence M. Fowler

Francis Bitter (1902-1967) left behind him a current of influence that surges on today, strong and lively. There is the Francis Bitter National Magnet Laboratory at M.I.T. There is a generation of students and researchers whom Bitter trained as a devoted teacher and as the author of widely used undergraduate texts. And, most pertinent of all, there is the monumental collection of scientific papers in which his results and his way of doing physics are preserved. This volume commemorates Bitter by reprinting a selection of the most significant of these papers.

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by Jay W. Forrester

foreword by John F. Collins

The urgent need for understanding the city — its growth, stagnation, and revival — is now evident as a national axiom. This book significantly advances such understanding. It reaches some surprising conclusions and is likely to raise spirited controversies, but of a sort that can only be fruitful in the long run. Professor Forrester develops in detail a dynamic model, or theory, of the processes that affect the life and death of cities. Such models, permitting dynamic experiments on digital computers, are perhaps more relevant today than the familiar scale models of the city planner. They are in fact the only really adequate technique for arriving at valid conclusions about present trends and future likelihoods.

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The Experience of the Guayana Program of Venezuela

by Lloyd Rodwin and Associates

For five years the Joint Center for Urban Studies of the Massachusetts Institute of Technology and Harvard University participated in a unique "alliance for progress" with Venezuela in planning the development of the Guayana region and the new city of Ciudad Guayana.

Planning Urban Growth and Regional Development is the third in a series of books devoted to an evaluation of this experience. Unlike the other studies, which dealt with specific aspects of the program, this one ranges over the whole process of development from inception to details of implementation. It provides an unusually frank appraisal by some twenty specialists involved in the Guayana Program.

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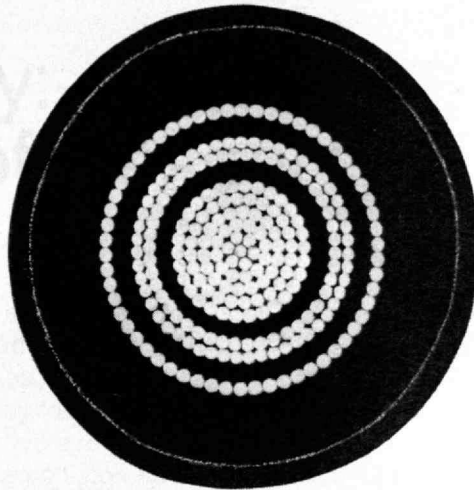
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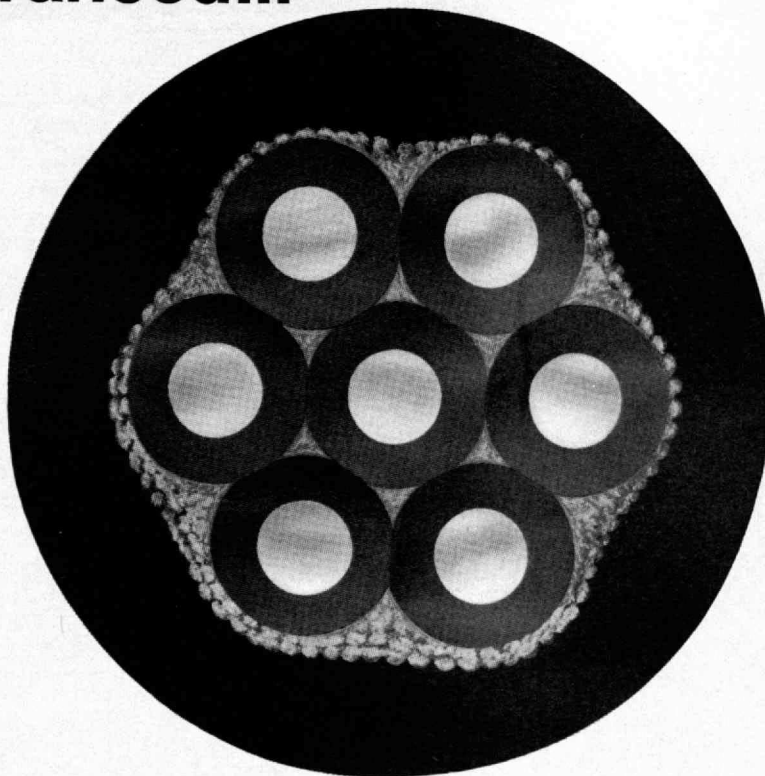
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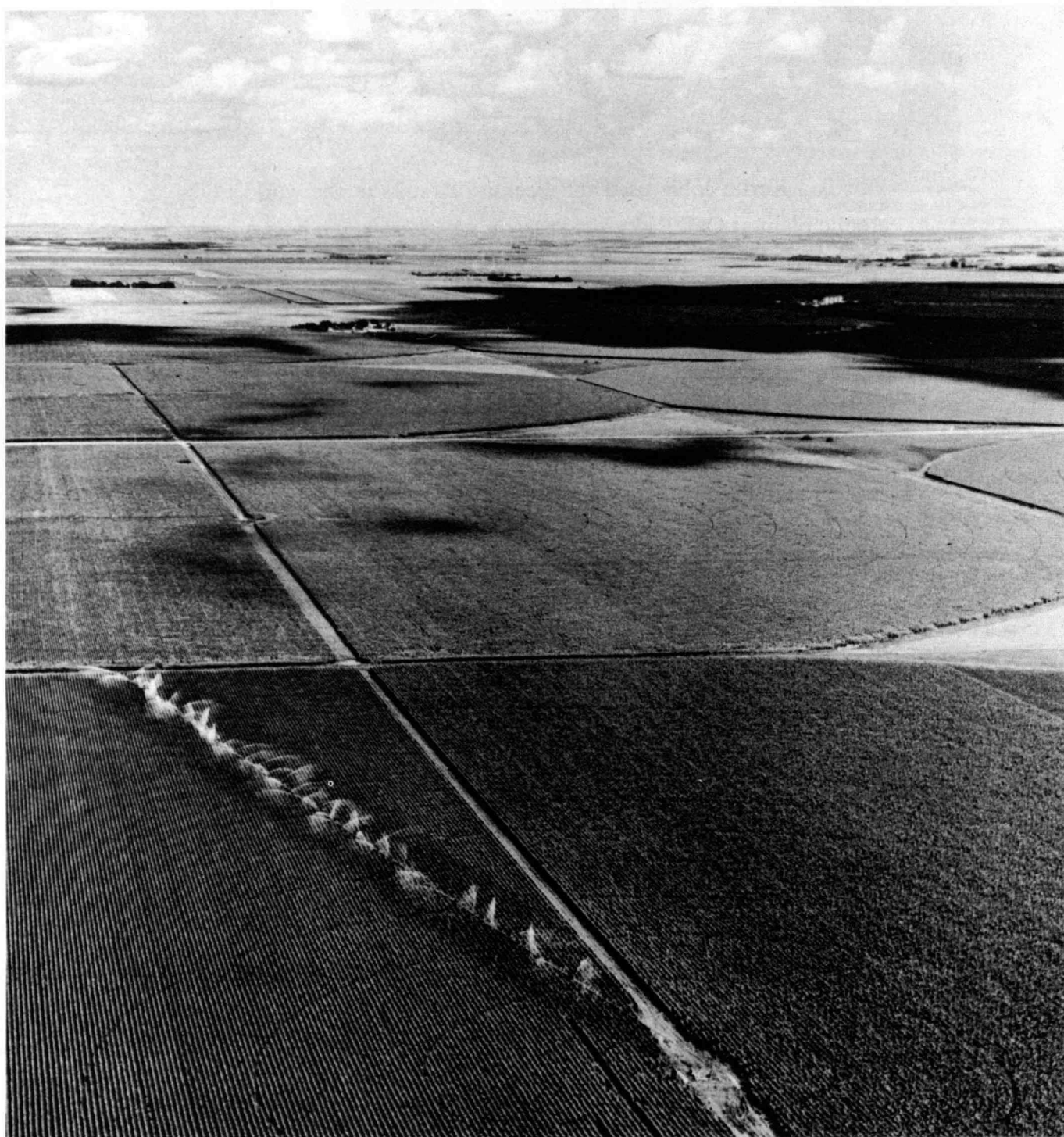
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(Photo: Jack Roberts, Holland Dreves Poff and Reilly, Inc., Omaha, Nebraska)



Agricultural efficiencies are rising so rapidly and new discoveries reaching application so quickly that man may have witnessed the last great famine on earth

Sylvan H. Wittwer
Director, Agricultural Experiment Station
Michigan State University

Food Supply: The Fruits of Research

Can we meet the food needs of an ever-expanding population? Are the prophets of doom correct in predicting a world-wide famine by as early as 1975, and telling us that the time is already too short for any remedial measures to be effective even if adopted immediately? Are we on a collision course, with food production always unable to match the needs of our world population?

We in this nation are in the midst of a most remarkable era of achievement in agricultural technology. Recent scientific advances have come in four stages and in the following rapid order:

First, a near-complete mechanization of cultural and management practices for crops, livestock, and poultry. Mechanical harvesting has already been developed for many crops and ultimately it will be for all. This change is demanding a complete re-appraisal of types and varieties, plant densities, spacings, water and fertilizer requirements, and labor supply.

Secondly, a dramatic chemical revolution. This involves an ever-widening use of new fertilizers, micro-nutrients, insecticides, fungicides, herbicides, nematicides, antibiotics, and bio-regulants for plants. In addition, there are numerous feed additives, growth factors, and protective agents for livestock and poultry.

Thirdly, remarkable breakthroughs in the genetic design of new strains and varieties of crops. Some of these, improved both in productivity and in protein quality, already have the status of super stars in the plant kingdom. Vast improvements in milk and egg production have been achieved through breeding and selection, and there is a "new look" for meat animals.

Finally, new systems of management and farm accounting. Corporate-sized operations and systems analysis in research bring with them an ever-expanding opportunity and demand for computers in agriculture.

This highly technical agriculture, based on scientific knowledge which we have largely taken for granted, has originated very recently. Only within the last 25 to 30 years have crop yields increased substantially in the United States. For 140 years (1800-1940) yields of corn, the number-one crop in the U.S., remained at 22 to 26 bushels per acre. Since 1935-40, however, yields of corn (and potatoes) have more than tripled, and those for wheat and soybeans doubled. Milk production per cow has increased each year for the last 20 years, and the slope of the curve is progressively more precipitous. New highs have been achieved in the production efficiency of eggs, broilers, turkeys, and pork. These records are comforting, when we remember that the arable land resources we can draw upon are limited.

Can these trends continue? What are the current limiting factors and yield barriers? Have we already reached genetic plateaus in the production of some commodities?

The Major Food Crops

It is natural to start with corn, of which the U.S. currently produces over half the world's supply—85 per cent of it as feed for livestock (in contrast, 75 per cent of the corn in Mexico is used for human food). The first yield barrier was broken in the late 1930's with the introduction of hybrids. A continuing improvement in hybrids and in the cultural practices of fertilization, minimum tillage, earlier planting, higher plant densities, and weed control have resulted in a steady and dramatic increase in yield, to a current level of 70-80 bushels per acre.

This is only a beginning. Theoretical yields of 400 or more bushels per acre have been suggested, and actual yields of over 300 bushels have already been achieved. Productivity can be further increased by improvements and changes in culture, including earlier planting, higher plant populations of uniform stand, equidistant precision planting, adequate starter fertilizer, irrigation, application of fertilizer during the growth of the crop through irrigation

water or otherwise, and use of herbicides that insure a weed-free environment.

A major limitation to the attainment of high yields in crops such as corn is the length of time required from planting until the leaf canopy covers the ground area. Corn plants of the future for the U.S. will probably be single-cross, short-stalked prolific hybrids, with vertical upper leaves and lower leaves more horizontal. They will be resistant to "lodging" (which is perhaps best shown by the wheat in the illustration on page 21). The varieties will be adapted to equidistant planting, and plant densities will range from 30,000 to 40,000 plants per acre rather than the current 20,000 to 27,000. They will be capable of capturing a maximum of solar energy for photosynthesis. This combination of variety and culture will also reduce the impact of rainfall on the surface soil, reduce weed growth, and increase the efficiency with which water is used.

The most important food crop both in the world and the U.S., however, is wheat. The new technology now being initiated with wheat in variety development and culture is reminiscent of that which occurred for corn over 25 years ago. Varieties yielding 100 bushels and more per acre are now being evaluated for local adaptability, particularly in the United States, Mexico, and India.

The long-standing yield barriers in wheat are being shattered. The record-breaking yields of wheat in the U.S. for 1968 (28.7 bu./acre) are just a beginning. Hybrid wheats, both of the spring and winter types, are yet to be introduced, and increased "hybrid vigor" should give a 30 per cent yield advantage and perhaps much more when it is coupled with more intensive cultural practices.

New wheat varieties now being distributed throughout the world are high yielding, short-straw, rust tolerant, and resistant to lodging. Resistance to mildews, smuts, root rots, virus diseases, Hessian fly, cereal leaf beetle, saw fly, and winter injury will soon be achieved. These varieties are responsive to higher supplies of fertilizer and water. They have great adaptability to differences in temperature and daylength. The whole range of new types which have appeared amount to a new dimension in wheat, and they offer man hope for new plateaus in food production.

A counterpart of what will likely occur with wheat has already been achieved with barley. The hybrid variety Hembar, which outyields other types by 15 to 35 per cent, has been introduced in Arizona, establishing that hybrid seed development in cereal grains can be a reality and is achievable by a number of alternative routes.

A new synthetic species, triticales, combining wheat and rye, also brightens the future for food production. The infertility problem characteristic of interspecies hybrids has been overcome, and plants that produce large filled heads of grain, far beyond that realized with wheat (or rye), have been created. Some have a much better amino acid distribution than either parent. Three important advantages have been realized: there is a substantial increase in production, the products are nutritionally superior, and the plants have great adaptability.

Rice is second only to wheat as a world food commodity. A billion people, mostly in the Far East, depend on it as their major source of energy. While it is not a major food commodity in the United States, achievements with rice—paralleling those with wheat—deserve mention. At the International Rice Research Institute in the Philippines, crosses between the tall tropical indicas and the short-statured types from Taiwan have shown yield potentials several times that of established types. As with wheat, the new types are superior in resistance to lodging and early maturity, and they show an indifference to photoperiod and a remarkable response to nitrogen fertilizer. Lodging heretofore has been the major impediment to higher fertilizer applications and yield, and mechanical harvesting.

The world is now achieving new records in the productivity of rice and wheat from varieties which are not just marginally better but far superior to the traditional ones. It is projected that in 1968-69 up to 40,000,000 acres of the new short-strawed cereals will be grown in the Far East. This is a dramatic transition in a period of only four years.

The great breakthrough in wheat and rice has come from altering the shape and form of plants genetically so that they respond to fertilizer without lodging. Attention is given also to the upright or vertical leaf character. There is one added feature with high yielding rice varieties. Most old types are "long season," taking six to seven months to mature. New short-straw high yielding varieties now grown in southeastern Asia mature in four to four and a half months. This can be reduced to three months where the seedlings are transplanted. The possibility of two, three, and even four crops a year now becomes a reality, thus greatly expanding the total productive capacity.

Thus far this concerted research effort has been limited to the world's most important food crops—rice, wheat, corn, grain sorghum, barley, and potatoes. Results have far exceeded expectations. More attention in the future is needed with peas and beans, the root crops, and in the tropics with cassava, coconut, and bananas.

Effect of Cycocel on lodging resistance of wheat. The wheat in the background has been treated with this growth regulator; that in the foreground has not.



New Approaches to Environmental Change

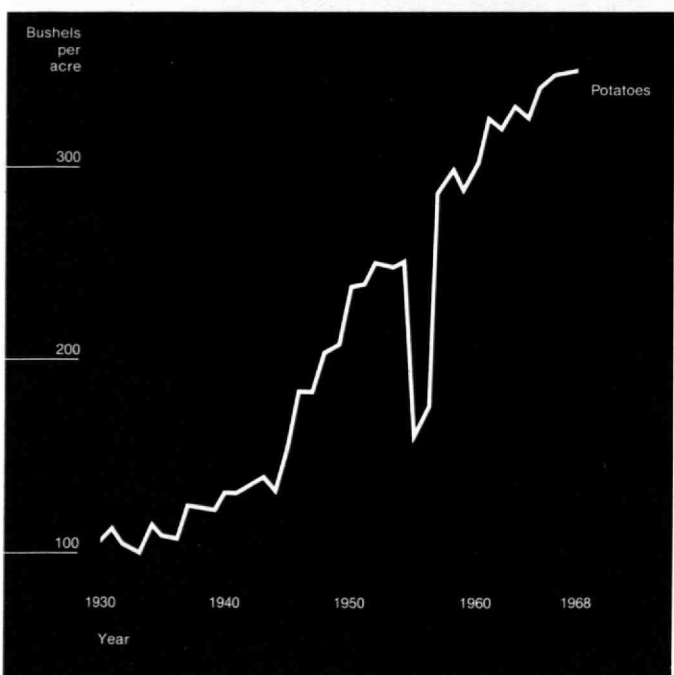
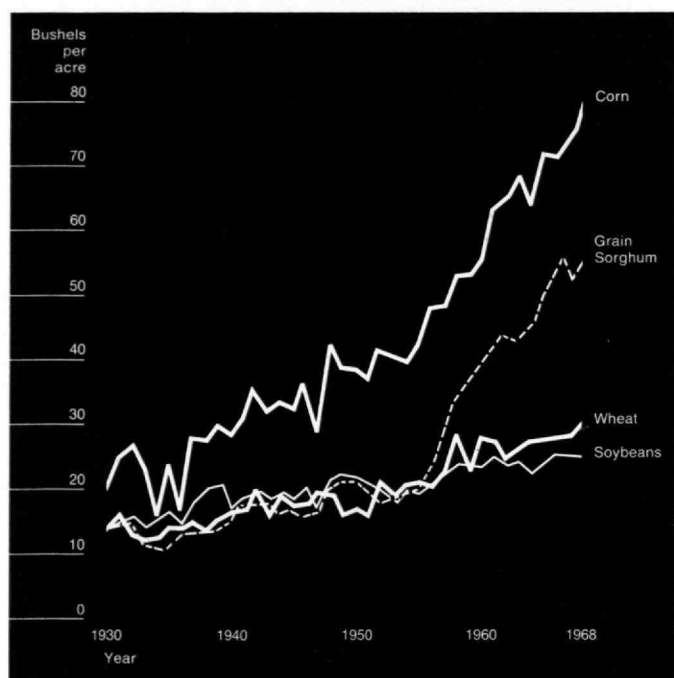
It has been estimated that 600 weed species cause an annual loss of \$2.5 billion, and an additional \$2.5 billion is expended in their control. Over \$4 billion is lost annually from the ravages of insects in crops and livestock, and plant diseases and nematodes account for a deficit of another \$3 billion. It is estimated that weeds, insects, and plant diseases result in an annual 20 per cent reduction in crop production in the U.S. The equivalent of 75 million acres is still being used to feed insects, weeds, and plant pathogens.

A partial breakthrough in insect control may be coming. The structure of the long-elusive insect juvenile hormone has now been worked out, and it has been chemically synthesized. All insects respond to it. As little as one gram per acre prevents larvae from maturing. It is not likely that insects

will develop resistance against their own hormone system, so recent work with the insect juvenile hormone seems truly to have opened a new door to pest control.

For increasing the water retention and hence productivity of the soil, subsurface asphalt barriers are being tried. Studies which are now in their fourth year have the potential of reclaiming for production of high-value crops millions of acres of heretofore unproductive semi-arid sand soils. Subsurface barriers have increased the water retention in fine sandy soils and have produced, in Michigan, increases in yields of tomatoes, potatoes, cabbage, beans, and cucumbers of 60 to 80 per cent.

The effectiveness of increasing the carbon dioxide concentration in greenhouse atmospheres is well established. (Yields of tomatoes, lettuce, and cu-



The yields of a number of important crops in the United States since 1930.

cumbers have been increased by 25 to 100 per cent, with a concomitant increase in quality.) Contrary to textbook dicta, carbon dioxide may also increase production when light is a limiting factor in photosynthesis. It is regrettable that with millions of dollars invested in research aimed at understanding photosynthesis, some reasonable investment in time and resources is not now made in extending the results of greenhouse enrichment studies to crops in the field—although corn, grain, sorghum, soybeans, sugar beets, barley, and rice have all responded dramatically in greenhouse tests. The promise of carbon dioxide fertilization is great, since carbon dioxide is perhaps, worldwide, the most limiting plant growth factor, and will become more of a limit in the future as other limits are pushed back. Carbonates are plentiful on the earth—a sleeping giant, waiting to be harnessed.

But let us return to the greenhouse for a moment. The world-wide land area under glass—fiber glass, plastic, and rigid PVC—is increasing by over 10 per cent per year, with the most extensive new holdings in Japan and Western Europe. Hydroponic culture, electrical heating with cables, and artificial lighting are receiving renewed attention. In the future we may heat our fields or crops as readily as we now irrigate them. The increasing availability of plastic and petroleum products for heating, covers, mulches, and subsoil barriers is extending the limits of crop production during early spring and late fall, and to soils heretofore not suited for agricultural purposes. Evaporative cooling by overhead "sprinkle" irrigation relieves the stress induced in plants by high daytime temperatures in summer. Irrigation is also increasingly important for frost and weed control and fertilizer application.

Various kinds of protected cultivation will in the future be increasingly important in food crop production, with attendant yield increases. Overhead sprinkler irrigation systems now offer frost protection for 20,000 acres of high-value crops in Michigan. Fuel systems have been profitably in-



Types of dwarf wheat, characterized as—left to right—tall, single, double, and triple types. (Photo: Dr. William Roberts at the International Maize and Wheat Development Center, Taluca, Mexico)

stalled for frost protection in apple, cherry, and peach orchards and grape vineyards at an initial cost of several hundred dollars per acre.

A revolutionary development with far-reaching implications in food production is found in a research package conceived by scientists at the University of Arizona, the University of Sonora (Mexico), and the Rockefeller University.

Inflated plastic greenhouses have been built, costing only about 15 cents per square foot, near the fishing community of Puerto Penasco on the Gulf of California. This location provides bright and plentiful sunlight almost every day of the year, but this is coupled with almost a complete absence of fresh water. The enclosed plants are grown in an atmosphere of approximately 100 per cent relative humidity and 1,000 ppm. of carbon dioxide (the normal outdoor figure is 300), thereby reducing the water requirements to 1 to 5 per cent of normal. The unlimited sea water is used for cooling in the summer and heating in the winter. (The direction in which such schemes may go in the future is described in another article in this issue by Edward A. Mason.)

Fertilizers and Regulators

There are critical stages in plant development when adequate or added growth factors may increase productivity. These are during early seedling growth, at flowering, and at early seed or fruit development. Fifty per cent of a corn or tomato plant's requirement for phosphorus occurs during the first 20 per cent of the growth. This early stage responds to "starter fertilizer." For the second stage, foliar applications have great potential. The leaf areas are large and often the leaf canopies are complete.

Phenomenal increases in plant productivity often are achieved by foliar feeding, in which specific nutrients are applied to the foliage. Two sprays of zinc sulphate at the rate of one pound of zinc per acre has markedly increased yields of Michigan

field beans. In California, a 3 per cent spray solution of ferrous sulphate resulted in a grain sorghum yield of 4,000 pounds per acre compared with only 250 for the non-sprayed.

Foliar feeding will assume greater significance with changing cultural practices—narrower rows and eventually equidistant spacings, higher plant populations, widespread adoption of irrigation to which fertilizer can be added for the major food crops, and ultra-low-volume aerial spraying with undiluted formulations. There is also the possibility of aerial application of the major, as well as the secondary and micro-, nutrients to crops that are in stress conditions, such as on sandy soils following a heavy summer rain. The nutrient requirements for maintaining growth and productivity can be met efficiently and immediately. Foliar feeding with nitrogen appears promising on cereal crops in India, where acute fertilizer shortages demand the highest efficiency of utilization.

The new rigid-straw, lodging-resistant wheat varieties described earlier can be simulated by treating a conventional crop with certain chemicals which act as growth regulators. Wheat, tomatoes, and a few other species are strikingly sensitive and responsive to a complex organic known as Cycocel. The chemical has great promise and is used extensively in Western Europe where considerable rainfall at harvest time and intensive cultivation and fertilizing normally produce tall leafy stalks and a tendency to lodge at harvest. There is an analogous chemical for soybeans, and there is also a chemical equivalent of the dwarf fruit tree, the growth retardant called Alar, which makes fruit trees bear after only four years instead of the usual seven to ten. In spring, Alar may delay flowering for frost protection. Mid-summer applications prevent or delay pre-harvest drop of fruit and improve it in a number of ways.

Gibberellin is perhaps the most widely used and proven growth substance in agriculture. It has revolutionized the production of Thompson seed-



The short-statured single-cross hybrid corn, with upright leaf character, for maximizing photosynthetic capability. (Photo: Alfred M. Ward and Sons, Akron, Colorado)

less grapes for table use in the past ten years, is used to delay rind senescence and aging in oranges and lemons, and has made possible mass production of hybrid cucumber seed, raising the productive capacity of pickling cucumbers by 25 to 50 per cent.

Agricultural Mechanization

Mechanization has accounted for much of the productive capacity of American agriculture, especially in the case of grains, forages, beans, potatoes, and sugar beets. The challenge for the future is with soft and perishable fruits and vegetables. In the long view, only those crops will survive commercially for which production and harvesting can be mechanized—which implies genetic and cultural modifications that will result in more uniform maturity, higher plant populations and improved weed control, as well as the development of new machines. We shall be producing fewer but higher-yielding commodities.

In 1968, 70 per cent of Michigan's 100,000-ton cherry crop and 90 per cent of the blueberries were machine harvested. All newly planted fruit orchards are being designed, and the trees trained, for mechanical harvesters. The double trellis system of training grapes for ease of mechanical harvest has at the same time doubled yields in vigorously growing vineyards—and this parallels what is happening with other crops.

Herbicides for Growth and Control

Weed-free environments are now a foreseeable reality for the major food crops (corn, sorghum, sugar beets, potatoes, beans, cucumbers) planted in rows and for almost all tree and small (soft) fruits. The application of selective herbicides with carefully timed sprinkler irrigation will eventually eliminate weeds in all crops normally planted in rows. In fruit orchards, vineyards, and berry plantations, weed control will be restricted to the area under the tree or vine in order to reduce competition for nutrients and water while minimizing the cost of chemical control. These changes are now taking place in many orchards, vineyards, and plantations.

Certain chemicals conventionally used as herbicides show great promise for increasing protein production in some of the major food crops. The original observations were with Simazine. Applied around fruit trees, it not only controlled weeds but enhanced shoot growth and improved the color of the foliage. In subsequent greenhouse tests and at subtoxic levels it caused the accumulation of 20 to 80 per cent more protein in rye. Seed from treated pea plants contained 40 per cent more protein, with no qualitative changes in amino acid distribution.

Field trials with several crops in Michigan and Costa Rica confirmed these findings. Both the yield and protein content of ryegrass forage and pea and bean seed were increased. The protein content was also increased in rice foliage, alfalfa forage, and oats.

These results suggest a new approach for increasing total protein and food productivity—a treatment that is inexpensive, easily applied, and does not conflict with established cultural practices.

Reflections and Projections

An exploding population that has doubled in the last 35 years, and will double again by the year 2000, is becoming almost synonymous with calamity. Yet even if this explosion continues (and serious

doubts have recently been raised as to whether it will) there is hope, in the shape of some of the food production records that have been achieved, where agricultural science and technology have been put to work.

This nation has, through research and technology, achieved the greatest food production record in the history of mankind. No other major country comes close. Less than 5 per cent of the people produce the food for the remaining population. Fifty million acres are rented out of production each year, and less than 17 per cent of the total income is expended in food.

Yields of corn, grain sorghum, and potatoes have more than tripled in the U.S. during the past 35 years. Those for wheat and soybeans have doubled. Although there has been no space here to deal also with animal husbandry, milk production per cow and eggs per hen have also almost doubled. In Mexico, food production has doubled and wheat yields have increased four-fold in the last 20 years (the current "Puebla Project" is designed to triple corn yields over a 200,000 acre area in the next three years). For West Pakistan and India, wheat harvests during this past year have been increased to 37 and 35 per cent, respectively, above any previous record. In many areas, the recent production explosion actually exceeds that of population.

I have waded through the paddies of the Far East where the new rice varieties are growing; trudged through the short-straw dwarf wheat fields of India and America; walked through fields of single-cross short-stalked corn varieties that yielded in excess of 200 bushels per acre in the U.S.; and viewed the composite corn varieties of Mexico (and we must not forget the synthetic "super stars" of triticales). I have followed, since their inception, the variety development programs and the changes in cultural practices and crop productivity that have accompanied the present mechanization revolution in the harvesting of fruits, vegetables, and nuts. I have seen a food factory in the desert.

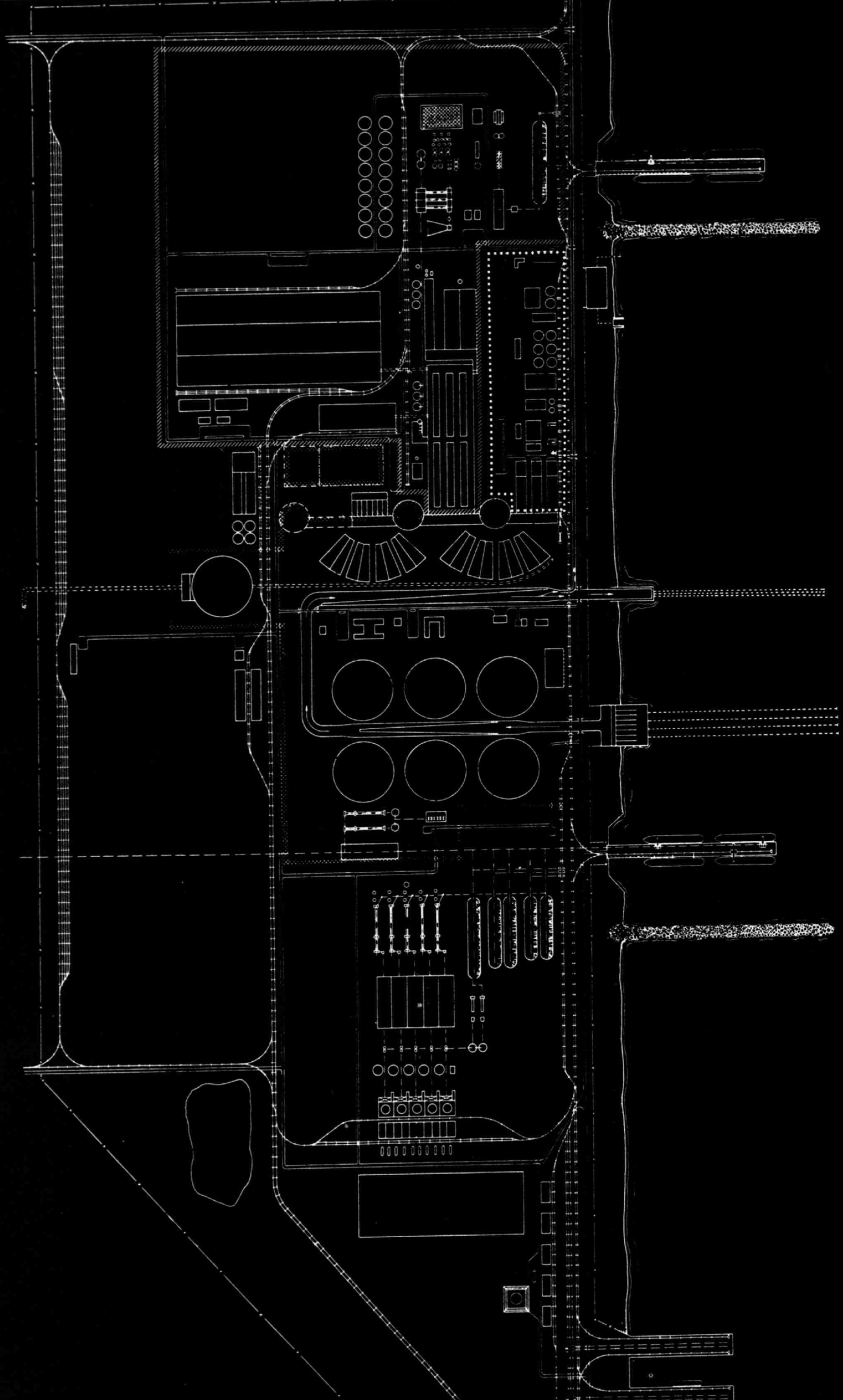
Today in the Punjab and Uttar Pradesh states, the bread baskets of India, there remain two great needs that must be fulfilled if people are to obtain the full benefit of the high productivity of the short-strawed rice and wheat varieties—fertilizer, and storage facilities. The dramatic achievements thus far witnessed in the Far East in cereal grain production have come about largely by the introduction of a single genetic factor in two commodities—the short, stiff straw. This may well be only a beginning in a surge of production comparable to that which we began to experience 30 years ago for corn and potatoes in the U.S.

One could surmise from all of this, and I will conclude with a note of optimism, that we have already witnessed the last great famine on this earth. I cannot agree with the advocates of world disaster that irremediable hunger is now, or will be stalking the earth in the near future. It is true that hundreds of millions suffer from malnutrition, and it is common today throughout the world—even in the U.S., where there is manifestly no excuse.

It would be a noble experiment, if our economy could survive, to remove all production restrictions and see what, with modern research and technology, could really be done by the American farmer with the inducement of a reasonable return for his investment in resources and labor. I am convinced that, if we put to use the knowledge we now have, the food productivity of our land could be doubled or even tripled in three to five years.

It took this nation 40 to 50 years—from about 1890 to 1935—under the Land Grant university system to reach a real pay-off in the increasing productivity of crops, meat, milk, and eggs. The agricultural technology which this represents could come much more quickly in other nations; it will continue at an ever-accelerating pace in the United States. The time between discovery and utilization of research is progressively decreasing. Today agricultural scientists can live to witness the fruits of their labors.

Sylvan H. Wittwer is Professor of Horticulture and Director of the Agricultural Experiment Station at Michigan State University, where he has been a member of the faculty since 1946. His research has involved the use of radioisotopes in studies of plant nutrition and chemical controls for the growth, flowering, fruiting, and senescence of plants; and he is a recognized authority on greenhouse tomato culture. This article is drawn from material prepared by Dr. Wittwer for presentation at the 1968 meeting of the American Association for the Advancement of Science.



One of the most powerful raw materials for underdeveloped countries could be the inexpensive electricity produced by nuclear reactors

Edward A. Mason
Professor of Nuclear Engineering, M.I.T.

Nuclear Reactors: Transforming Economics as Well as Energy

Industrial complexes are today being recognized as a means of optimizing raw materials, power sources, and capital investment to achieve greater efficiency in industrial production. But with few exceptions, these concepts have been applied in only the highly developed nations of the world—the United States, the Soviet Union, Europe, and Canada. There is now evidence to suggest that modern technology, through nuclear reactors and desalination systems, gives such industrial complexes special leverage upon the problems of less developed nations, where the triple needs of food production, industrial production, and fossil fuel resources are acute.

A recent study carried out by myself and colleagues at the Oak Ridge National Laboratory focused on the feasibility of an industrial complex based upon nuclear power generation in a developing region. Our results show that a nuclear-powered industrial complex, including desalinated water for agriculture, could sustain—and indeed transform—the lives of some 25 to 75 million people.

Industrial Complex Benefits and Costs

The idea of using large energy centers for production is not new. For example, there are already large industrial complexes in the Gulf states of the U.S. powered by inexpensive gas and in South Africa powered by inexpensive coal. The Consumers Power Company of Michigan has announced plans to construct two nuclear reactors, of 800 megawatts each, to provide electricity and steam to the Dow Chemical Company complex in Midland, Mich., thus forming the first closely coupled nuclear complex. The rapid growth and development of nuclear power technology, the savings to be made by large-scale nuclear power generation, and the increasing knowledge of desalination combine to suggest the usefulness of such complexes in very different settings.

The term “nuclear agro-industrial complex” describes a complex based on a nuclear energy source, where the power produced is used for in-

dustrial and desalination plants and the water produced is used for agriculture. To draw together the implications of the concept, I will outline a prototypical nuclear agro-industrial complex and some of its functions and consequences. However, the reader should bear in mind that the information from which I draw is specific, “building block” data, designed to aid in evaluation of the concept’s usefulness in specific climates and conditions; the general model is merely a summary.

In our prototypical complex, power is supplied by two nuclear reactors. The steam generated by these flows first to electric generating turbines. Steam is extracted from the turbines at a temperature approximating 260°F and is then sent to seawater evaporators, where one half of the seawater is distilled into fresh water. The remaining brine salts—which are twice as concentrated as the original seawater—then forms the feed solution for the recovery of seawater chemicals.

The electricity produced is employed in a number of energy-intensive processes, such as the production of caustic and chlorine and of electrolytic hydrogen for manufacturing ammonia, aluminum, and phosphorus. The water from the desalting plant is employed in the irrigation of a large, intensively-operated agricultural project called a “food factory.”

Two principal questions are:

1. What impact could such complexes make on industrial and agricultural production? and
2. What benefits, especially economic, might result from such ventures?

A Food Factory for 2.5 Million

The answers are impressive. For each 1000 megawatts of electricity used in the production of ammonia, 690,000 tons per year of nitrogen would be fixed; this is equal to one-ninth of the 1966 production in the United States and twice that of all of India. Similarly, if 1000 Mwe. were used in the production of phosphorus using the electric fur-

nance method of reducing phosphate rock, approximately 1.5 million tons of phosphate would be produced—an amount equivalent to one-third of the 1966 production in the United States and 13 times that of all of India. For each 1000 Mwe. of electricity used in the production of aluminum, one-half million tons of aluminum would be produced; this is equal to one-eighth of the U.S. production and seven times of that of all of India. It is clear that the electrical output of even a single nuclear reactor could make a significant impact on the production of basic fertilizer and metal products.

The impact on food production of a nuclear agro-industrial complex which is capable of producing 1000 Mwe. as well as 400 million gallons per day of desalted water is also impressive. As noted above, the electricity is sufficient to produce approximately 2000 tons per day of ammonia and 360 tons per day of elemental phosphorus. This production is in the ratio of two pounds of nitrogen per pound of phosphate, which is a typical ratio for the application of these two plant nutrients.

The size of the food factory is governed by the amount of water available for irrigation; the 400 million gallons of water per day would be sufficient to irrigate approximately 240,000 acres of land for one crop in the absence of supplemental rainfall. In order to even out the load on the water desalting plant and to avoid having to store large quantities of water, the plant would probably be located in a region where two crops could be grown per year, so that the food factory in this particular example would probably consist of approximately 120,000 acres of irrigated land.

This food factory would be capable of producing approximately 2.6×10^9 lbs. of food (grains, legumes, vegetables) per year, which under a diet of 2500 calories per day would feed about 2.5 million people. (Less than half the people in the world now receive a diet of 2500 calories per day.) Some of the fertilizer produced in the industrial

complex could be used to fertilize the land. The remainder of the fertilizer—over 90 per cent of the total production—could be used to increase food production in off-site areas where water is available. In this case, approximately 10 million acres of land could be fertilized for one crop, producing an increment of 15 billion pounds of grain (on the basis of present-day yields) due to the fertilizer addition. Or, assuming yields of the type realized in India by new varieties under intensive cultivation, an increment of 45 billion pounds of grain would be produced. This incremental grain would be sufficient to feed from 25 to 75 million people.

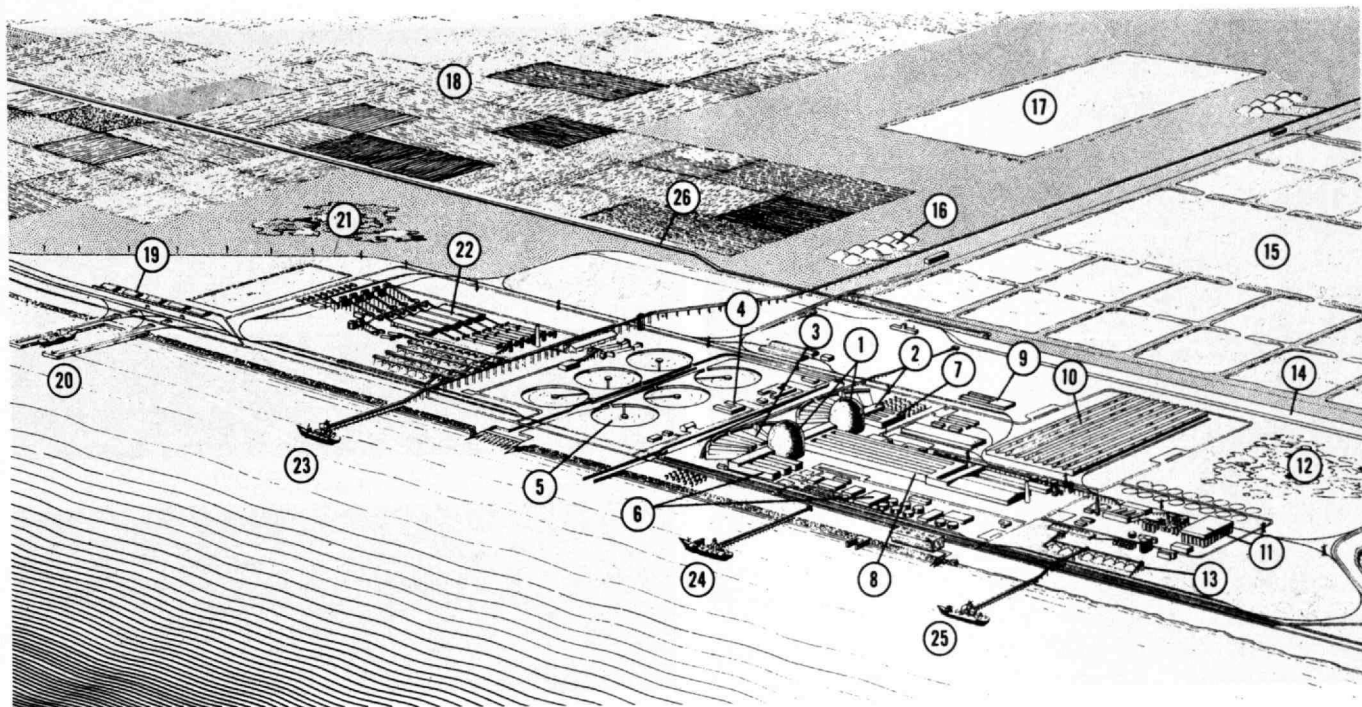
Thus even a single large nuclear power center could make a significant impact upon the production of a number of basic chemicals and provide water and fertilizer to nurture the cultivation of food to feed millions of people.

Providing New Freedoms and Benefits

In addition to such a quantitative impact, there are other factors unique to nuclear energy which favor its effective use in such a complex. For example, due to its concentrated nature, nuclear energy offers a ubiquity of location for power generation not shared by coal, gas, oil, or water power. A power station producing 1000 Mwe. with a load factor of 80 per cent requires about 3.5 million tons of coal annually but only 35 tons of nuclear fuel—a factor of 10^5 difference in the amount of fuel to be transported and stored. The transport of fuel for a nuclear station, therefore, adds little to the generated cost of energy, and nuclear energy plants may be placed in remote locations, near the source of raw materials if they are bulky and their transportation a large cost factor, or near the markets if the raw materials are readily available. A new degree of freedom is thus provided in the location of energy-intensive industries.

For instance, a simple industrial complex located in Florida would take advantage of the presence of low-cost phosphate rock and the proximity to bauxite ore in the Caribbean. Our studies show

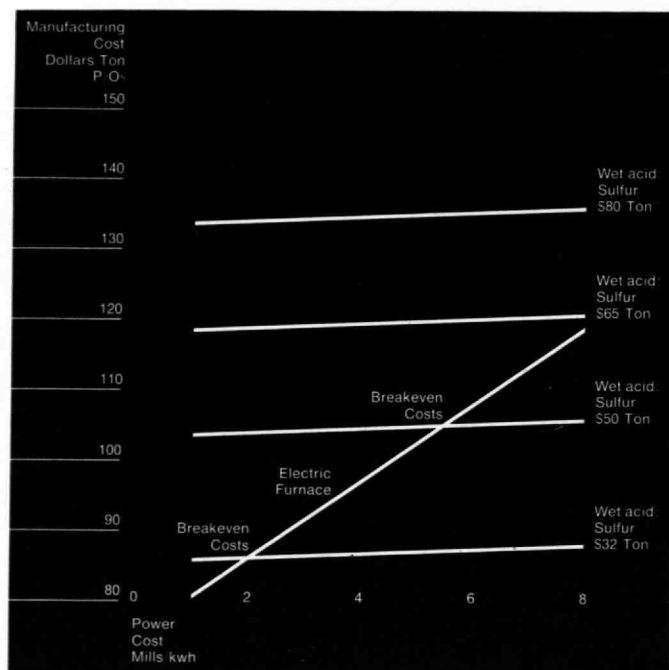
The plan on the frontispiece represents the same area as this perspective drawing of how a nuclear agro-industrial complex stretching along the shore of a coastal desert might be arranged. The complex as proposed would produce and consume 2000 Mwe. of electricity and 1 billion gallons of fresh water per day. Included are a 300,000-acre "food factory" irrigated with water from the sea-water evaporator and industrial plants to produce aluminum sheet and bar stock, electric-furnace phosphorus, caustic chlorine by brine electrolysis, and ammonia from electrolytic hydrogen. (Drawing: Oak Ridge National Laboratory)



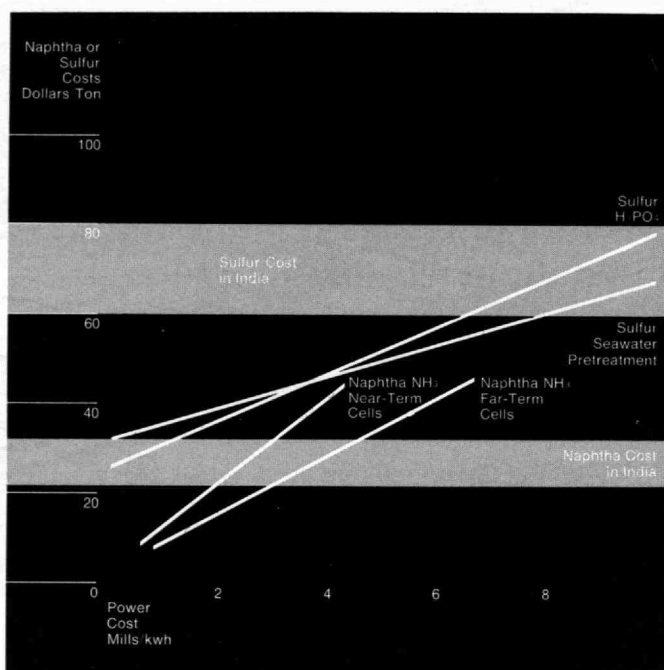
Legend:

- 1—Reactor
- 2—Turbines
- 3—Evaporators
- 4—Administrative offices
- 5—Seawater treatment plant
- 6—Caustic chlorine plant
- 7—Electrolytic-hydrogen plant
- 8—Aluminum smelting plant
- 9—Ammonia plant
- 10—Aluminum fabrication plant
- 11—Alumina plant
- 12—Alumina plant waste
- 13—Bauxite storage
- 14—Railroad yards
- 15—Solar salt works
- 16—Salt storage
- 17—Storage pond
- 18—"Food factory" farm
- 19—Food warehouses
- 20—Food export dock
- 21—Phosphorus plant waste slag
- 22—Electric-furnace phosphorus plant
- 23—Phosphorus-import salt-export pier
- 24—Ammonia and aluminum export pier
- 25—Bauxite import pier
- 26—Main irrigation canal

A comparison of the manufacturing costs for phosphate fertilizer using the electric furnace process and the more conventional wet acid (sulfuric) process in a plant producing 1500 tons a day, assuming phosphate rock delivered at \$9.60 per ton. The manufacturing cost for the wet acid process is strongly dependent upon the price of sulfur, so several lines representing different sulfur prices are shown; but their slopes are low because the wet acid process uses relatively little electricity. On the other hand, the electric furnace process uses no sulfur, and consequently a single line is shown which is strongly dependent upon the cost of the electricity employed. For instance, if sulfur costs \$50 per ton, the break-even electrical power cost between the two processes would be approximately 5.3 mills/kwh.



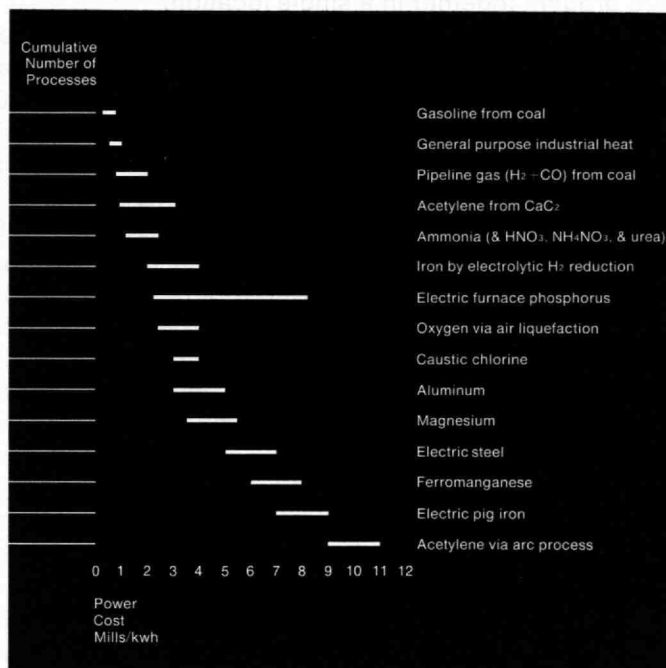
Break-even power costs vs. raw material costs for the production of phosphate fertilizers by the sulfur (wet acid) process and by the sulfur-seawater pretreatment process, and for the production of ammonia by the cracking of naphtha and by the electrolysis of water.



that such a nuclear industrial complex powered by a 1050-Mwe. light-water reactor could produce approximately 1200 tons per day of elemental phosphorus and 685 tons per day of aluminum for a capital investment of \$500 million and show an annual rate of return of 19 per cent.

Furthermore, cheap abundant electricity is an extremely versatile "raw material" which can be substituted for critical minerals in the production of many chemicals, fertilizers, and metals. For instance, electricity can be used to produce hydrochloric acid from salt and water or nitric acid from air and water, and these acids can substitute in many cases for sulfuric acid which today consumes large quantities of sulfur. Ammonia can be produced from water and air using electricity which thus substitutes for the coal, natural gas, and oil which are used in many parts of the world today to make ammonia. Iron and steel can be produced from iron ore, water, and electricity, thus eliminating the need for the large quantities of coke generally employed.

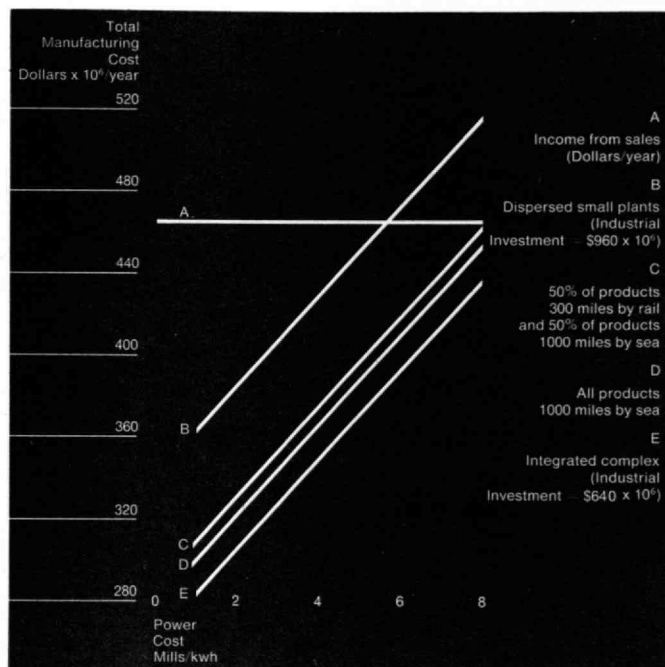
The elasticity of demand for electricity for processing as a function of its cost. The length of each line represents the range of power costs needed to make electrical processing competitive with conventional production methods, depending (over the line length) upon the cost of the competing raw material, the size of the plant, and the cost of money.



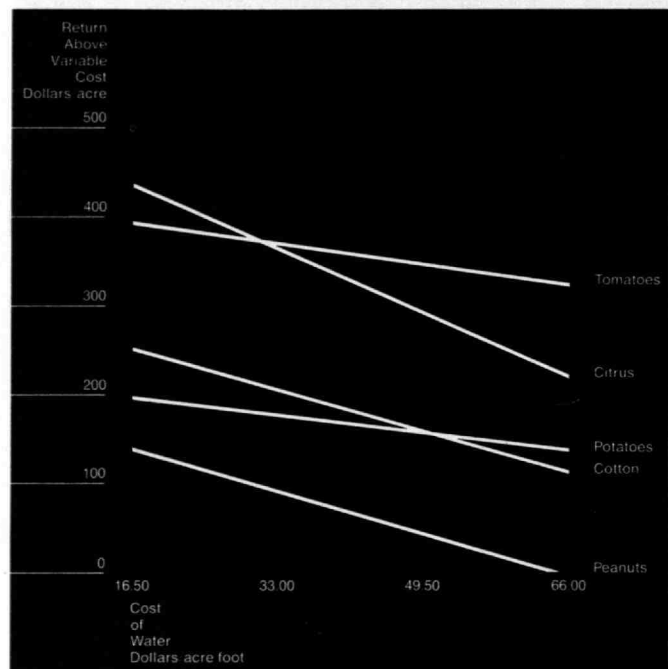
Preliminary feasibility studies of break-even power costs show that electric-intensive processes would in many cases compete favorably with a chemical, or conventional, process. The first chart shows that if power costs are below 5.3 mills/kwh. and sulphur costs \$50 per ton, the electric furnace process would produce phosphorus more cheaply than the conventional wet acid process, assuming a reasonable cost for money to finance the new plant and a 15-year plant life.

Sulphur is currently used in the form of sulfuric acid to prevent the formation of calcium scale in the desalting process. However, brine can be electrolytically converted into hydrochloric acid which would substitute for the sulfuric acid; the break-even power cost for this process is shown on the chart, in relation to the conventional wet-acid process. The next chart shows that electricity-intensive processes would be attractive in India if power costs below 6 to 8 mills/kwh. were available; although present energy costs in India now exceed this level, these costs should be attainable using nuclear reactors of reasonable size.

The relative costs for operation of a large complex and of a number of smaller, dispersed production units, assuming a total daily production of 3000 tons of ammonia, 1500 tons of phosphorus, 685 tons of aluminum, and 2000 tons of chlorine or 2600 tons of caustic. The solid line shows production cost in 20 dispersed small plants, each producing a fifth of the total amount of one product; the patterned lines show the cost in an integrated complex which produces the entire production shown. Plant capital and operating costs as well as wholesale prices representative of a foreign installation were used, and the large plant was variously penalized for the cost of shipping its products by rail and sea as shown. The integrated arrangement would presumably obtain additional cost benefits from its large power source.



The effect of water costs on the return above variable costs for a number of crops as a function of the cost of water. The annual fixed cost for operating a large irrigated farm supplied with desalted water was estimated to be approximately \$150 per acre per year, and water consumption rates were estimated from climatic conditions in the Southeastern Mediterranean, where two crops per year could be grown.



We have also studied the break-even power costs for the production of ammonia using hydrogen from the cracking of naphtha and using the electrolysis of water in the case of the energy-intensive process. The cost of producing the ammonia is not only sensitive to the power cost but also to the type of electrolytic cell employed; two levels of cell technology are indicated. The production of ammonia from naphtha would not be competitive in India until electric power costs are reduced to the neighborhood of 2 to 4 mills/kwh. And in the United States, where cheap natural gas is available, the break-even power cost for the production of ammonia using electrolytic hydrogen would be approximately 1 mill/kwh., which is not attractive.

A number of other processes have also been evaluated for their break-even power costs. Electric steel can be made competitively with conventional open hearth steel, for example, if electricity is available in the price range of 4 to 7 mills/kwh. Iron can be reduced using electrolytic hydrogen instead of carbon if power is available in the range

of 2 to 4 mills/kwh. As its cost decreases further, electricity begins to compete as a source of thermal energy, and indeed gas and gasoline could be made by hydrogenation of coal using hydrogen from the electrolysis of water if power costs in the range of 1/2 to 2 mills/kwh. were available. Thus it can be said that inexpensive electricity represents a valuable "raw material" resource for the future.

The Advantages of Concentration

In addition to these potential benefits from the use of electricity in individual processes, the concept of an "agro-industrial complex" suggests additional benefits resulting when a number of processes are brought together in a single location.

A large, integrated industrial complex has advantages of economies arising from scale, shared facilities, decreased transmission costs, and possible utilization of by-products. In contrast, small dispersed plants can be nearer their markets and thus reduce distribution costs. Detailed studies summarized in the chart on the previous page show that an integrated complex, even with the highest transportation cost assumed, shows an annual savings relative to the dispersed system of approximately \$100 million, or about 25 per cent of the total costs of production and shipping.

These studies of industrial production were supplemented by analyses of the use of desalted water in intensive agriculture. Assuming a desalination plant built in an arid coastal region where at least two crops per year could be grown, the results indicate a number of crops which could be grown profitably at water costs ranging as high as 20 cents per 1000 gallons. Wheat would be a break-even crop if water were priced at about 8 cents per 1000 gallons, peanuts at 12 cents, and potatoes at more than 35 cents. (These figures are quite sensitive to the assumed crop prices; for example, increasing the assumed price of wheat from 2.7 cents (paid to farmers in exporting countries) to 3.3 cents per pound (delivered price to India) increases the break-even cost for water to nearly 17 cents per 1000 gallons.

Toward Further Evaluations

As a consequence of the results summarized here, the concepts of energy centers and agro-industrial complexes are beginning to receive increasing attention. The Indian government, in co-operation with Oak Ridge National Laboratory and the United States Atomic Energy Commission, conducted a feasibility study during January to September, 1968, the preliminary results of which indicated rather attractive possibilities for increasing India's production of fertilizer materials and food. Furthermore, Oak Ridge National Laboratory is carrying out a detailed study of uses for a large energy cen-

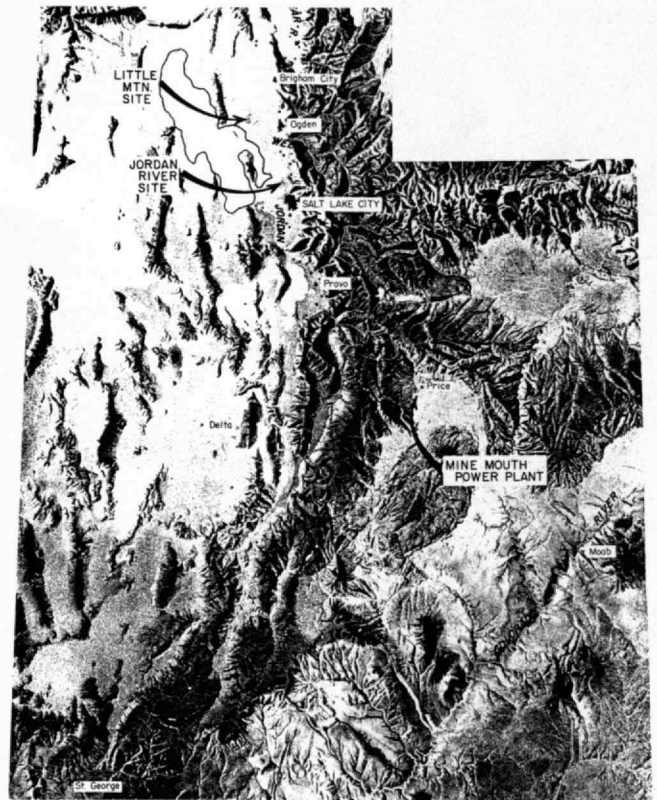
An agro-industrial complex for the American West, suggested by the Utah Division of Water Resources. A report published recently contends that "a unique opportunity for desalting exists in the Salt Lake City area in terms of the needs for municipal and industrial water supplies, power and process steam for industrial development." Brackish water now entering Great Salt Lake at the rate of 1,600,000 acre-feet a year could be desalted, with the lake serving as a natural basin for brine disposal; there is "a major potential industry" for mineral recovery and processing brines from the Great Salt Lake; and both fossil and nuclear heat sources show promise for the 500 to 1000 Mwe. power sources which would be required. The Division suggests a nuclear desalting-power-process steam production complex at Little Mountain or a fossil-fueled power plant near Price, Utah, tied to a desalting plant on the Jordan River. (Map: Utah Division of Water Resources)

ters in the Middle East. A study is beginning of opportunities in Puerto Rico for large energy center. Other areas with high energy costs, such as New England, or with particular mineral resources, such as Florida, seem to offer potential applications.

But there are also potential limitations to the concept and usefulness of nuclear agro-industrial complexes which should be mentioned. Our study focused largely on "building block" information—details of individual industrial processes and farm crops. The aim was to make this information as useful as possible to those studying individual sites and conditions. Our subsequent assembly of these blocks into a generalized complex—such as the model shown in the frontispiece—should be viewed largely as an illustrative example.

Most of the proposals considered in the study are enormous from the standpoint of capital investment, management, operation, transport, and other technological support. From a sociological standpoint, for example, obtaining the requisite information on sociological problems would require a much larger pilot farm than is needed for most agricultural development projects.

To complete any economic feasibility study for a specific installation on a specific site, the proposed agro-industrial complex should be compared with the best alternative for doing the same total job for the same general area. Such an analysis will require additional study: research and development on key industrial processes whose nature and usefulness could be changed by widely available, cheap power; investigation of financing possibilities and rates of financial return (in some cases, nuclear-powered industrial and agro-industrial complexes seem to project internal rates of return in excess of 10 per cent, and in one special case—the Florida phosphate deposits—the rate of return is 19 per cent); and research on intensive agricultural development through establishing an experiment farm in a warm, arid region watered by a small fossil-fueled evaporator.



Further studies of the total plan, and especially intensive research on these specific issues of industrial and agricultural development, will make clear the conditions under which the nuclear agro-industrial complex can be a powerful tool for change in today's world.

Edward A. Mason, who holds S.M. ('48) and Sc.D. ('50) degrees in chemical engineering from M.I.T., headed the study of nuclear-powered industrial and agro-industrial complexes—of which this article is a report—at the Oak Ridge National Laboratory during the summer of 1967. He has been a member of the M.I.T. faculty since 1957 and Professor of Nuclear Engineering since 1963.



Last year, politics notwithstanding, a number of U.S. scientists visited Siberia to observe the September solar eclipse. Here one of them tells the story and shows some of the remarkable photographs they obtained

Wallace P. Boquist
President, Technology International Corporation

The Eclipse Expedition to Soviet Siberia

While nations march and flex their strength as great powers in the intrigues of international politics, it is often true that scientists and their governments can circumvent many of the political, social, and ideological pressures inherent in such societies, and seek to solve the mysteries of the universe we inhabit. During the extremely uneasy political period of late summer 1968, the governments of the United States and the Soviet Union agreed on a cultural exchange program which permitted twelve American scientists to join with scientists from six other nations in a journey into Soviet Siberia, to study the total solar eclipse of September 22, 1968.

A combination of timely efforts by officials of the U.S. State Department (including Dr. J. K. Rouleau, M.I.T. '28) and the National Science Foundation, which acted as co-ordinator for the American teams, achieved such an arrangement a scant two days before our departure from the United States on September 9. Although more teams were originally scheduled to join the expedition, the final contingent consisted of representatives from E. G. & G., Inc., Boston, Mass.; Adelphi University, Long Island, N.Y.; the University of New Mexico, Albuquerque; and McDonnell-Douglas Corp., Huntington Beach, Calif.

Eclipse Measurements

Eclipses of the sun have fascinated mankind since the earliest times with their awe-inspiring beauty and physical impact. As scientists first began to sense the true geometry and motion of the immediate universe, early astronomers (who gradually became aware that this phenomenon would be repeated from time to time) took up the challenge of predicting the time and location of the future eclipses. Astronomers later developed a further interest as it became apparent that only during an eclipse was it possible to see the far-reaching outer structure of the sun. Near the beginning of the Twentieth Century a telescopic device known as a solar coronagraph was developed which could artificially obscure the intense solar disc, permitting observations of solar prominences and the close-in

corona extending a very few solar radii from the sun. The outer corona, however, has been visible only during an actual solar eclipse until recently; rocket-borne coronagraphs now photograph the corona from altitudes beyond those of atmospheric scattering limitations.

Within the past few years eclipse observations have been involved in new and invigorating types of investigations. While the structure, brightness, and spectral-temperature characteristics of the solar corona and prominences receive ever-increasing attention, a related study of the effect of total eclipse on the earth's upper atmosphere—in particular the ionosphere at about 80 km. altitude—has developed. The abrupt cut-off and reappearance of direct sunlight (observationally, the second and third contact between the solar and lunar edges) provides a unique experimental circumstance; it cannot be wholly duplicated artificially—and only approximately by a high-altitude burst of a large nuclear weapon. The ionizing effect of the solar visible and ultraviolet light and x-rays can be studied during an eclipse by radio sounding of the ionosphere and, more recently, by rockets which directly measure the electron density.

Optical observations and measurements of solar eclipses received a big impetus in the early sixties with the availability of high-altitude jet aircraft which were able to provide a stable and essentially vibration-free instrument platform. Two major advantages accrue from the use of such aircraft platforms: first, there is the obvious one—the aircraft can fly above the cloud cover; secondly, the use of aircraft virtually eliminates the possibility of radiations from the extremities of the solar corona being swamped by scattered light from the atmosphere. My colleagues and I have been fortunate to have participated during the last six years with Air Force Cambridge Research Laboratories and Atomic Energy Commission aircraft projects in performing eclipse measurements over northern Canada in July, 1963, between Tahiti and South America in May, 1965, over the Aegean Sea in May, 1966, and

over southern Brazil in November, 1966. These measurements included studies of the solar corona and prominence brightness histories, and the correlation of these with atmospheric effects.

The Journey to Yurgamysh

The September 22, 1968, eclipse path originated in the Arctic region, traversed Soviet Siberia in a more or less southerly direction, and terminated in the Sinkiang Province of Continental China (*see map*). The place where the total eclipse would last longest (about 42 seconds according to prediction) was near the intersection of the eclipse path and the Trans-Siberian Railway, 2000 km. east of Moscow and about 300 km. beyond the Ural Mountains.

The Soviet government was not inclined to approve the use of high-altitude aircraft near restricted areas in eastern Siberia. But in the late spring the American expedition teams were informed that the Soviet Astronomical Council of the U.S.S.R. Academy of Sciences had arranged to activate the "Orljenok" Pioneer (Boy Scout) Camp located within the eclipse path and near the Trans-Siberian Railway's Station Yurgamysh for Soviet and visiting foreign eclipse experimenters.

After a summer of preparation, changes, and final testing, we arrived in Moscow on the newly inaugurated direct jet flight on September 10. The reader need not restrain his imagination as to the immediate confusion that reigned as we arrived without apparent warning at Moscow airport customs with more than twenty crates of telescopes and photographic and electronic equipment, much of it U.S. government property. The problem was solved by the arrival of a representative of the Soviet Astronomical Council, who arranged to have the U.S. equipment stored and shipped to Siberia on the Trans-Siberian Railway. Because of possible delays in obtaining confirmation of the shipping date and the fact that a Soviet holiday also intervened, we were informed that there was no need for us to precede our equipment to Siberia, and that we could spend several days touring Moscow.

We viewed this situation with mixed feelings. On the one hand we had not expected an opportunity to tour the Russian capital at such leisure—but on the other hand the knowledge that we would have less than a week to set up, align, and check out our equipment in an unknown environment and climate was, to say the least, somewhat disconcerting. In any event there was little choice, so we saw Moscow by day and at night mentally rehearsed an efficient set-up procedure for the campsite.

The journey from Moscow to the eclipse site was made on Aeroflot with stops in Kazan, Sverdlovsk, and, finally, Kurgan, a city of three-quarter million inhabitants, where we were met by Professor M. N. Gneveshev of Pulkovo Observatory, the chief of the Russian expedition and our official host. After a specially prepared dinner and, of course, Russian vodka at a Kurgan hotel, we managed a few hours' sleep and the following morning made our way by bus to the eclipse campsite near Station Yurgamysh, which is located at 56° N. Latitude. The two-hour drive offered us our first look at the Siberian countryside and rural life. With little exception all of the crops in the area had been harvested a few weeks before we arrived, as the temperature at night frequently was below freezing.

A Cosmopolitan Camp

The eclipse site was certainly more than we expected. The Russians had obviously gone to great lengths to provide their guests with comfortable accommodations and good food. Arriving as late as we did, we found that most of the Soviet and other foreign experimenters had their instrumentation in place and operating prior to our arrival. The Soviet contingent consisted primarily of scientists from five major universities and institutes. The foreign groups represented England, France, the Netherlands, Switzerland, and Italy in addition to the United States. The Italians drove a small van truck all the way from Rome (a distance of more than 5500 km.), bringing not only their instrumentation but an adequate supply of Chianti, tomato paste, and spaghetti to supplement the camp menu.

The center line of totality on September 22, 1968, moved across the frontier lands of central Asia. To serve their own and visiting scientists, the Soviets activated a Pioneer (Boy Scout) Camp near Station Yurgamysh on the Trans-Siberian Railway, near the point where the total eclipse would last longest. Here, says the author, the Russians went "to great lengths to provide their guests with comfortable accommodations and good food."





The remarkable photograph opposite, taken of the 1968 eclipse as second contact (totality) is about to begin, shows on a single image the surface of the sun, solar prominences (at about one o'clock in the picture) and intermediate corona, all without overexposure—a brightness range of approximately six orders of magnitude. This photograph and the mid-totality photograph on page 34 were made by an important new process (described below) by which variation of color represents variation in brightness—without relation to the true color of the scene. Both were made by the author and Dennis E. Overbye on September 22 with the sun at an elevation of 19° above the horizon at about 1615 hours.

Twenty minutes before first contact, Professor S. K. Vsekhsvyatsky (below) of Kiev University posed with his chronometer, with which he made accurate measurements of the onset and apparently premature end of totality. (Photo: Wallace P. Boquist)



The unique photographic film used to obtain the photographs shown in the accompanying article was first developed over five years ago by Charles W. Wyckoff (M.I.T. '41) of E. G. & G., Inc., of Bedford, Mass. (a company whose founders, Harold E. Edgerton, Kenneth N. Gernsmaier and Herbert E. Grier, are all alumni of M.I.T.). Subsequent improvements and refinements in the experimental emulsion have resulted in an extended-range film which is now coming into use in numerous scientific and commercial applications.

The remarkable achievement in this specialized emulsion is that it provides an exposure latitude in one film which has never before been achieved. A single common photographic emulsion will generally respond to a range of exposures covering about three orders of magnitude. In order to photograph an object which extends beyond this range in brightness, either at one instant or as a function of time, it has been necessary in the past to use several cameras.

Wyckoff's solution to this problem has been to sandwich together a number of emulsion layers, each with a different characteristic speed. The fastest layer is at the top. The dimmest parts of the object are photographed by this high-speed layer, leaving the lower layers unaffected. Brighter regions of the image saturate the high-speed layer, leaving it in the condition of a constant-value filter, and are recorded on the next layer down, and so on. Three layers of properly selected emulsions are sufficient to give an overall exposure response of eight orders of magnitude.

Extracting a positive image from such a film is analogous to making a color print. In the development process the silver images in the three emulsion layers are replaced by color dyes, resulting in a series of superimposed color negative images, each covering a particular subrange of intensity. By either viewing or printing the recorded image through a color filter, any chosen range of intensities can be presented, including ranges intermediate between the inherent sensitivity ranges of the layers. Thus, the colors in two photographs on pages 34 and 38 correspond to different intensities of light coming from the solar source, and the prints themselves correspond to different parts of the total intensity range.

The Soviets, as would be expected, had the largest variety of equipment. It included a 20-foot-focal-length horizontal camera brought from Kiev University by the world-famed astronomer Dr. Vsekhsvyatsky to record the detailed structure of the inner solar corona, two radio telescopes from Leningrad University operated in the 5- and 10-centimeter bands, and a complement of visual and ultraviolet spectrographs under the supervision of E. I. Magilevsky of the Institute for Terrestrial Magnetism in Moscow.

The Americans were generally concerned with measurements of the coronal structure, white light radiometric power, and an independent experiment to search for small comets during totality. The instrumentation consisted of specially designed photographic and photoelectric systems, some of which utilized new experimental film emulsions developed by C. W. Wyckoff of E. G. & G., Inc.

The weather at Yurgamysh alternated between cold sunless days, with maximum temperatures of about 40°F. , to days of little cloud cover which seemed to reach the low 70's in the midday sun. Because of the alternating weather and possible condensation problems in the equipment during the cold nights, we assembled our equipment in our heated cottage and did not move it to the observation site until the morning of the eclipse. With the aid of three Russian students assigned to our project, we were to set up our equipment and check it out before lunch time.

The Eclipse

The day of the eclipse was unbelievably clear and free of all but small scattered cloud formations. From the Yurgamysh site—which was reportedly within 300 meters of the center line of the eclipse—the sun would be only 19° above the horizon at eclipse time—about 1615 hours. This meant that we would be looking through 2.7 air masses (where one air mass corresponds to looking straight up). This alone precluded any hope of coronal observations beyond about three solar radii from the edge of the photosphere.

Soviet instrumentation at the Station Yurgamysh eclipse observation site on September 22, 1968, included coronal cameras, spectrographs, and two small radio telescopes. The weather—clear and cool—favored the scientists from seven nations who used the Siberian location.



The beginning of the partial phase of the eclipse (first contact) occurred somewhat more than an hour before the beginning of the short totality phase. As the partial phase progressed we checked our camera focus and tracking alignment and gave final instructions to the two Russian students operating our third camera system. During the final minutes before totality the sun and sky had very obviously darkened (an effect not generally noticeable until then), casting a very unnatural hue on whatever it illuminated. By this time, the local temperature had begun to fall. The drop is often of the order of 15°C . As has been observed, too, for centuries past, the birds began to stop chirping and the cows in the nearby meadow began to low and started a premature journey home.

As we were watching the approach of totality through our filtered telescopes, we were startled to see, about ten seconds before second contact, bright pinkish red prominences emanating from behind the obscuring moon. Because of their extreme brightness and height, they could be seen

even while a significant portion of the bright solar disc was still visible. We immediately started the instrumentation, closely following a preplanned program of exposure variation for the various cameras. An occasional momentary view through the tracking telescopes on each camera provided a truly magnificent view of the phenomenon (we could not watch it for any length of time, of course, for fear of retinal burns).

Thirty-five seconds after totality began it ended, to the surprise of everyone, who had anticipated a duration of 42 seconds from both the American and Russian predictions. No explanation was immediately available, although the U. S. Naval Observatory personnel subsequently began an attempt to reconcile the observations with the earlier predictions.

The eclipse over, the American teams dismantled and repacked their equipment for the journey home. In honor of the occasion, the Soviet hosts invited all present to attend a celebration and fare-

Weather Modification and the Biosphere

well party and dinner that same evening. We shall all, I think, especially remember the wonderful cordiality and friendship resulting from that evening.

The results of the E. G. & G., Inc., experiments were very gratifying, producing among other data some of the best eclipse photographs we have ever obtained. The extended range XR negative film from which the eclipse photographs shown here are made utilizes color variations to indicate variations in recorded brightness. This is a way of reconciling the brightness variation which occurs in some of the eclipse photographs (approximately 10") with the exposure latitude of photographic printing paper, which is orders of magnitude less. The color in the photographs therefore does not usually bear any resemblance to the actual color of the object.

A very prominent "hedgerow" prominence system is seen in the photographs at about the one o'clock position, as well as numerous other prominences around the perimeter of the eclipsed sun, which was near the peak of its eleven-year activity cycle. The structure of the intermediate corona can be seen to somewhat beyond two solar radii in these photographs and almost three solar radii in other data records. This was through almost three air masses; in contrast, results obtained during the 1966 eclipse from the aircraft platforms flying over South America show solar streamers nearly ten solar radii in length.

1970 and Beyond

The results of the analysis of the 1968 eclipse data will be used primarily to aid in preparations for the 1970 eclipse, which will traverse the breadth of southern Mexico, sweep across Florida, and follow the Eastern coastline across Nantucket Island into the Maritime Provinces. As the maximum totality duration (about three minutes) occurs over Mexico, we will most likely be operating from aircraft flying over this region, just west of the Pacific coast line, and in the eclipse path over Florida near where the rocket and balloon-borne experiments presently

being planned will probably occur. As a consequence of the cultural exchange agreement which allowed us to enter Russia in 1968, Soviet scientists will be extended a reciprocal invitation to an eclipse site somewhere in the southeastern United States. It is to be hoped that this will permit the American scientific community, as well as others, to enhance the Soviet scientists' knowledge and views of American life, and thus in some way contribute to more harmonious relations among our countries and peoples.

Looking beyond 1970, it would appear that interest in eclipses will come to be associated relatively more with their effect on the earth's atmosphere; for, increasingly, it will become possible to observe the eclipsed sun, for other purposes, from manned stations on the moon and from interplanetary vehicles. In escaping from the earth, we at last cease to depend on the moon to obscure the sun for our investigations of this celestial body.

Wallace P. Boquist has been involved in experimental science activities in remote places around the world since leaving M.I.T., where he graduated in general science and engineering in 1954. After spending more than seven years at E.G.&G., Inc., he has recently founded Technology International Corporation of Boston, Mass. Accompanying Mr. Boquist on the eclipse expedition was Dennis E. Overbye, who graduated in physics from M.I.T. in 1966 and who has been with E.G.&G. for two years.

"Weather modification may exert an influence on the biosphere by altering the input of energy into the system or by disturbing the flow of material through it. To predict the consequences of weather modification, one needs detailed and quantitative knowledge of the influence of weather and climate on individual organisms and particularly on societies and communities of organisms. . . ." (Photos pages 42, 46 and 47: Richard M. Koolish)



Because we know so little of the complex interrelations between plants and animals and their terrestrial environment, taming our weather presents imponderable risks as well great economic advantage

Frederick Sargent, 2d
Dean of the College of Environmental Sciences
University of Wisconsin—Green Bay

Weather Modification and the Biosphere

Whenever they carry on natural life processes, organisms effect changes in their conditions and their habitats. Man is no exception. But he is unique in the scale of his capability to bring about such modifications, because he is unique in his ability to control energy. Man has recklessly exercised this capability to modify his environment on the ethical assumption that the bountifulness of the habitat was solely for him.

Only in recent decades has man begun to perceive the widespread implications and consequences for the fitness of the biosphere of his technological activities. This awareness of the human imprint has, however, developed at a crucial time in man's history. For he is now beginning seriously to contemplate manipulations of the habitat far more ambitious than any heretofore attempted. Indeed, as his numbers increase, man is impelled to plan on this scale as a strategy for survival.

The quest for water is one of the projects in this program of environmental manipulation. And increasing control of weather processes is one strategy in the quest for water.

However, as man plans for conscious weather modification, he suddenly finds that his technological activities have already set in motion weather changes, the consequences of which can only be dimly perceived.

To deal with the problems, both inadvertent and conscious, which weather modification poses, one must understand the transactions and flows that take place between organisms and between organisms and their habitat. But our knowledge of these is grossly incomplete, and our uncertainties simply emphasize the wisdom of R. Theobald when he wrote, "It is no longer sufficient to argue that a person 'meant well' when his intervention in a personal or social or ecological situation worsened rather than improved the situation. Today it is necessary to possess information, knowledge, and wisdom before acquiring the right to interfere."

Weather Modification—Inadvertent and Conscious

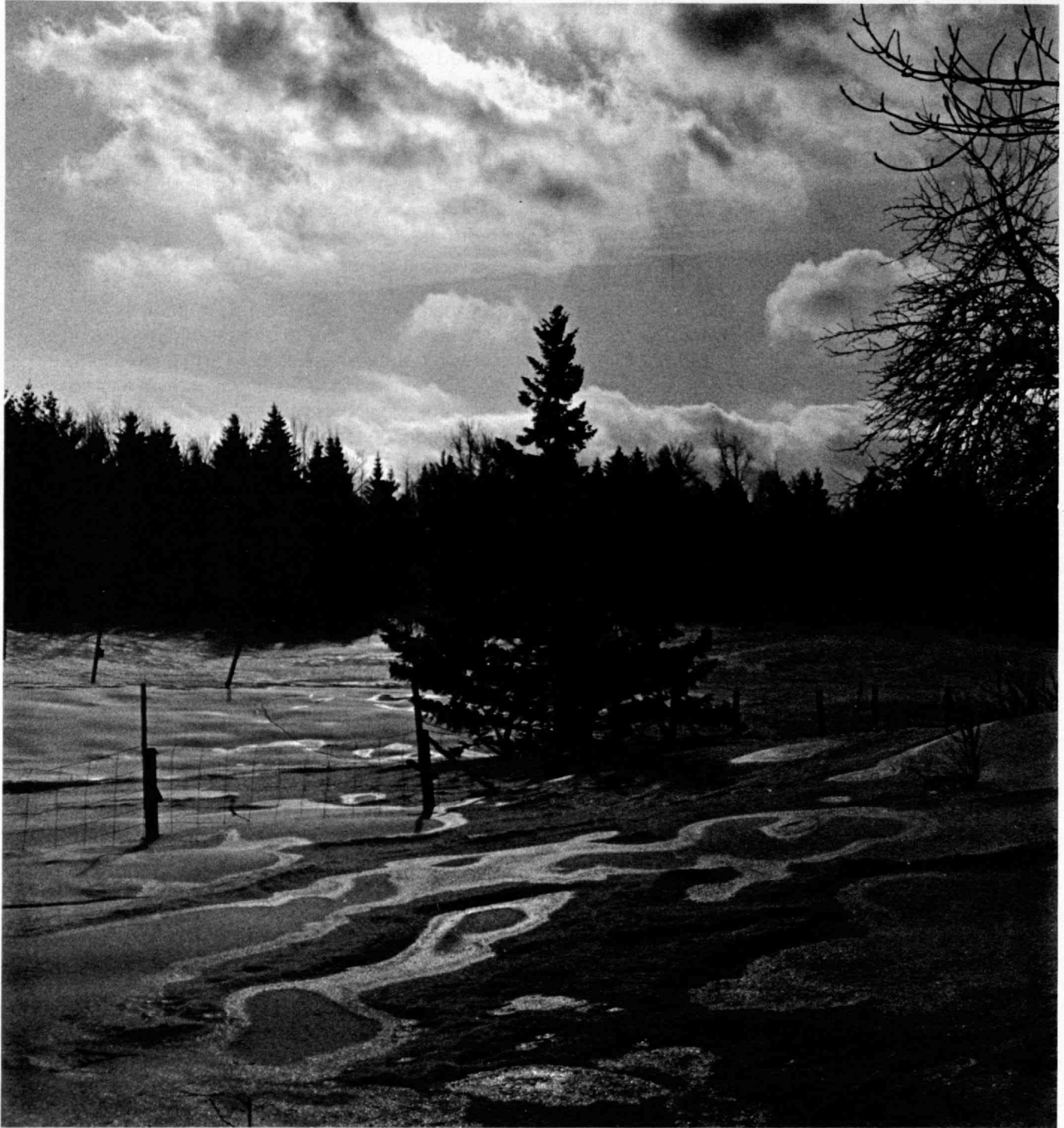
Man's achievements in the realm of weather modification—both inadvertent and conscious—must be understood before we examine their implications for the transactional networks and flows of the ecosystem.

Most of man's inadvertent weather modification has resulted from pollution of the atmosphere by discharges from his technological establishment. Thermal pollution of the air over cities has caused them to become heat islands. Particulates and freezing nuclei have increased at all levels of the troposphere and have been related to increased cloudiness. The increase of atmospheric aerosols and particulates has been associated with an increase in atmospheric turbidity. Although direct measurements have not yet shown it, the greater cloudiness and turbidity threaten to reduce solar isolation. At the same time there has been a measurable rise in atmospheric carbon dioxide. Because this gas has a "greenhouse" effect, several observers have forecast a general rise in the global air temperature of as much as 4°C by the year 2000.

These conflicting trends have been developing only during relatively recent years. So it is difficult to make realistic predictions about which inadvertent process may eventually dominate. This matter is further complicated by the fact that long-term swings of global temperature and rainfall are natural phenomena. Thus one must be cautious about proposing cause-and-effect relationships. But the changes are continuing and indeed accelerating, and they will probably prove most difficult to reverse. We can but make more intensive measurements and work systematically toward a better understanding of the complex interrelations of these atmospheric processes.

Within the past decade man has had sufficient success with manipulating weather processes to encourage him to press on toward greater and more precise control. His most notable accomplishments have been the dissipation of cold fogs over airports

"Weather modification may exert an influence on the biosphere by altering the input of energy into the system or by disturbing the flow of material through it. To predict the consequences of weather modification, one needs detailed and quantitative knowledge of the influence of weather and climate on individual organisms and particularly on societies and communities of organisms. . . ." (Photos pages 42, 46 and 47: Richard M. Koolish)



Because we know so little of the complex interrelations between plants and animals and their terrestrial environment, taming our weather presents imponderable risks as well great economic advantage

Frederick Sargent, 2d
Dean of the College of Environmental Sciences
University of Wisconsin—Green Bay

Weather Modification and the Biosphere

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The oxygen and carbon cycles of the ecosystem demonstrate in their interrelations how complex are the earth's life systems—and, indirectly, how difficult will be the task of understanding the response of these systems to changes in the environment in which they operate. (Chart from Bioscience by R. B. Platt and G. K. Reid)

and a significant increase in rainfall from clouds that are already precipitating. Warm fogs have not yet yielded to human intervention. Whether man can control hailstorms remains controversial, for there have been claims and counterclaims.

Taken together, these achievements support the inference that conscious modification of mesoscale weather systems will probably be operational within a decade. Furthermore, experimentation continues and large-scale investigations are being contemplated. Unfortunately, the planning is generally being carried out without regard to the consequences for the biosphere. It is imperative that biologists be involved in the planning process so that we may have the broadest possible overview.

The Fitness of the Ecosystem

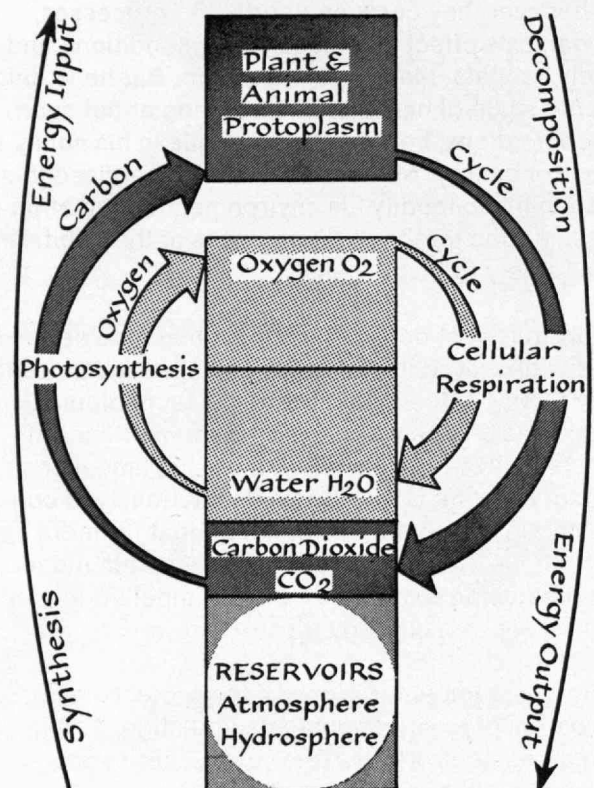
"Ecosystem" is the operational term that biologists use to identify the transactional networks among organisms and between organisms and their habitat. All living things are related to one another in societies and communities, and each organism is inexorably bound to its habitat. This interdependence of organism and environment, developed in the long course of evolution, is an essential characteristic of the ecosystem. The properties and processes of the environment are thus unique, for they provide the ingredients and conditions that meet the specific needs of organisms. It is reasonable to speak of this mutual adaptation as having achieved over a long period of time the "fitness of the ecosystem."

The transactional networks of the ecosystem comprise a balanced cycle of synthesis and decomposition based on air, water, and various minerals. The system is driven by solar energy, and it is open in the sense that energy in the form of heat is constantly being lost back into space. Energy is captured for the system by the photosynthesis carried out by green plants, turning the materials of the habitat into energy-rich and biologically useful nutrients. The decomposition of these nutrients begins when the green plants are eaten by the hierarchy of con-

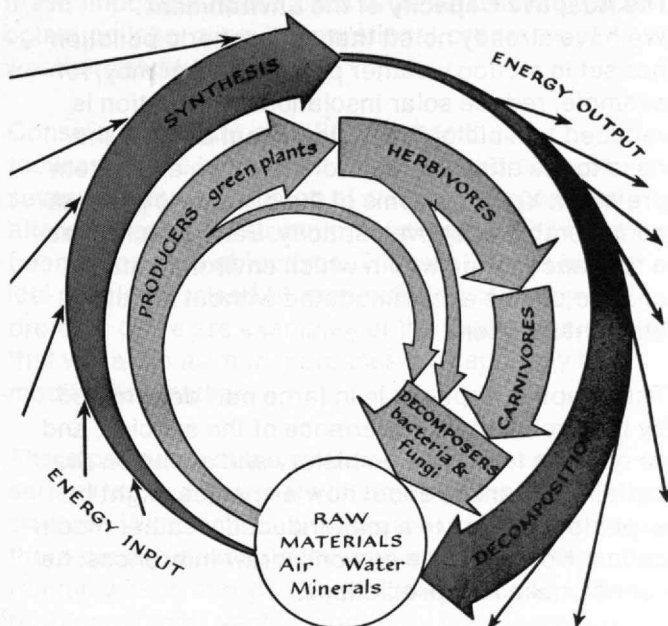
sumers, the herbivores and carnivores, and ends as the decomposers break down the detritus of the system into simplified organic or inorganic forms.

Actually this sequence of synthesis and decomposition drives a number of subcycles, including the hydrologic, oxygen, carbon, nitrogen, and phosphorus cycles. Each depends upon the one-way flow of energy from the sun through the ecosystem and upon complex transactional relationships between societies and communities of organisms.

The hydrologic, oxygen, and carbon cycles are particularly vulnerable to the alterations in the weather. Under the action of photosynthesis, carbon is drawn from the reservoir of the atmosphere and synthesized into the protoplasm of plants and animals. At the same time oxygen is released into



The earth's ecosystem consists of a balanced cycle of synthesis and decomposition, powered with an energy input supplied from the sun. The energy output is radiated as heat and light into the atmosphere and ultimately into the universe. (Chart from Bioscience by R. B. Platt and G. K. Reid)



the atmosphere from the hydrosphere. By means of cellular respiration and decomposition of organic material oxygen is recycled to the hydrosphere and carbon is recycled to the atmosphere. These synthesizing and decomposing sequences tend to maintain the amounts of oxygen and carbon dioxide in the atmosphere at levels compatible with life in the biosphere.

In many respects this view of the general ecosystem is highly simplified. Actually there are diverse ecosystems, some natural—the ecosystems of the tropical rain forest, the grasslands, the deciduous forest, the arctic tundra—and some based on man's agricultural activities. Each ecosystem is a distinctive configuration of plants and animals and habitat conditions among which a balance has been established. Yet within each there is considerable inherent adaptability, so that daily, seasonal, and secular environmental changes can be tolerated and accommodated.

Implications of Weather Modification

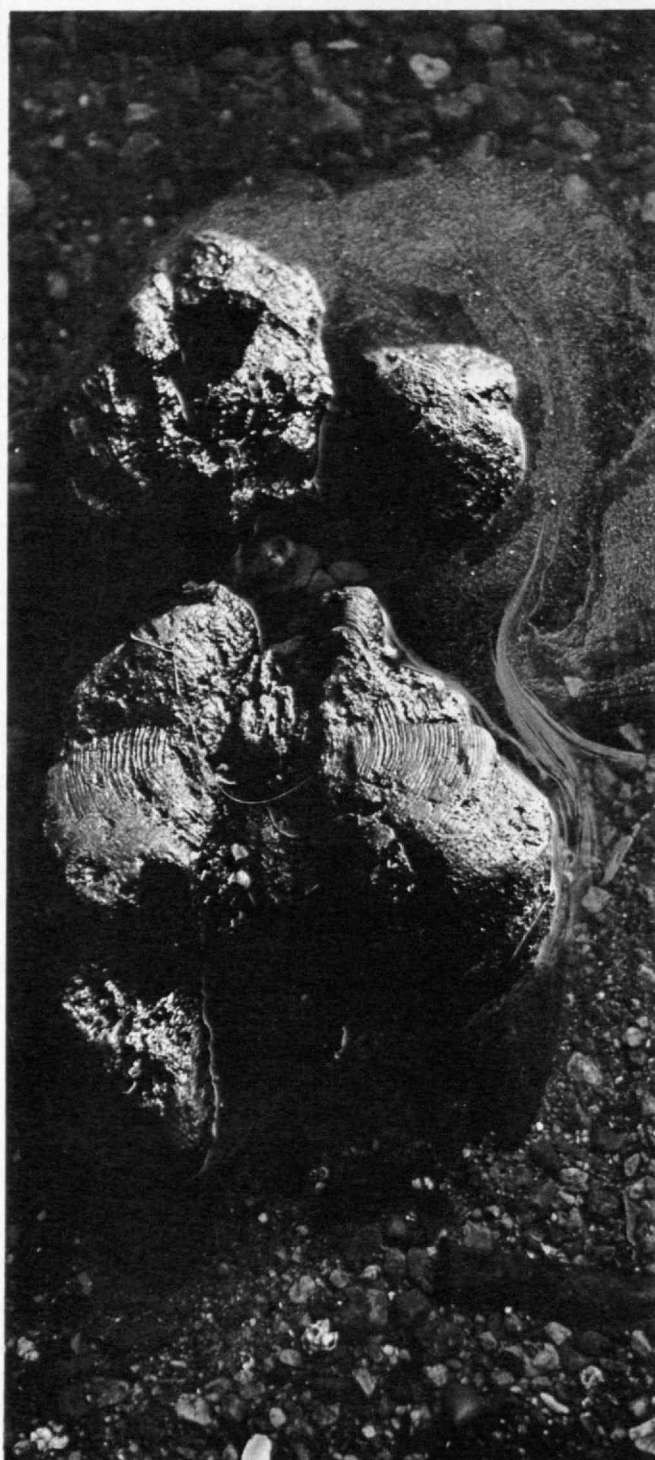
Weather modification may exert an influence on

the biosphere by altering the input of energy into the system or by disturbing the flow of material through it. To predict the consequences of weather modification, one needs detailed and quantitative knowledge of the influence of weather and climate on individual organisms and particularly on societies and communities of organisms; and, unfortunately, such knowledge is in general not now available.

We need information that will help us to anticipate the nature and magnitude of biological changes that may result from a given weather modification. Some of these cause-and-effect relationships seem relatively simple: increased precipitation might favor tree growth but deep snow seriously impair overwintering elk. But other biological effects may be remote from the target of the weather-modifying operation. Outbreaks of pests or of plant and animal diseases might materialize as a consequence of heavier amounts of rain and weaker animals. Weeds and undesirable animals might move into habitats made hospitable by weather modification. It is equally possible, however, that the altered weather might prove favorable for plants and animals desirable for man.

Problems such as these arise because the interrelation and interdependence of groups of organisms in the ecosystem are hierarchical and maintained by complex metabolic networks and regulatory processes. Thus we must especially focus attention in ecological studies associated with experimental weather modification on the susceptibility to environmental change of crucial links in the metabolic transactions. These are the connections that are essential for the sequential flows of energy and material.

Clearly the green plant is one of these crucial links, for it captures the energy that drives the ecosystem. The green plant is responsible for the production of biologically useful nutrients, and it plays a major role in maintaining the atmospheric content of oxygen and carbon dioxide.



The Adaptive Capacity of the Environment

We have already noted that atmospheric pollution has set in motion weather processes that may, for example, reduce solar insolation. If insolation is reduced to a biologically significant degree, the risks to the effective functioning of the ecosystem are clear. Yet organisms of the biosphere possess considerable adaptive capacity. Each species has a tolerance range within which environmental change can be accommodated without affecting efficient function.

The adaptive capacity is in large part determined by the evolutionary experience of the species, and so one can from data on history and evolution draw certain inferences about how a species might be expected to react to a man-induced weather modification. However, one can only draw inferences; he cannot make firm predictions.

Interactions among organisms occupying a given habitat also condition how any single species will react to environmental change. While we have considerable information about how individual organisms react to weather and changes, the response of communities and systems is much less well known.

In the context of the assumption that the annual precipitation can be increased 10 to 20 per cent every year for 15 years or more, C. F. Cooper has suggested several interesting hypotheses by which to anticipate broad ecological consequences, based largely on evolutionary experience. He suggests that "sensitivity to biological change . . . will be least in humid climates, greatest in semiarid areas, and somewhat less in arid regions." He proposes that "areas normally subject to great year-to-year variations in rainfall will be less susceptible to a planned change than areas of comparable but more uniform precipitation." And, he says, "communities displaying wide year-to-year fluctuations in the populations of their components will be less sensitive to climatic change than those with stable populations." Professor Cooper emphasizes that

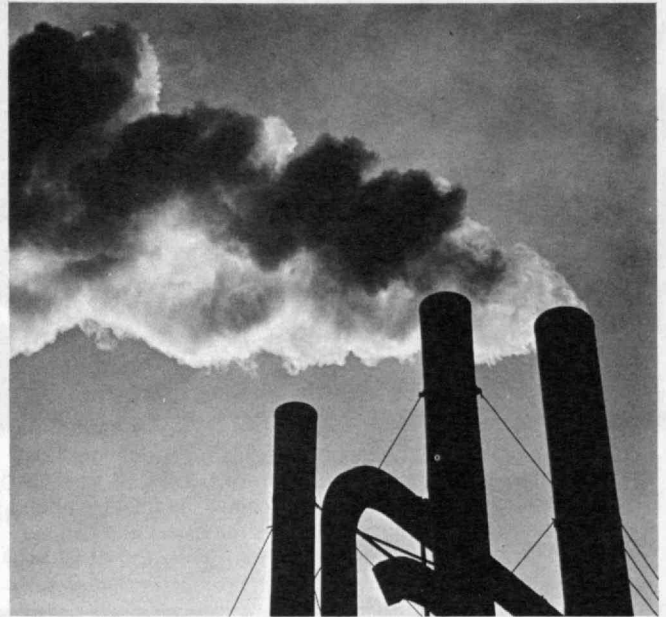
these important hypotheses must be tested by ecologists collaborating in operational programs of weather modification.

Conscious weather modification has thus far focused on the hydrologic cycle. Amelioration of severe storms, alleviation of water shortages, and altered seasonal distribution of precipitation have been among the objectives. The small-scale biological problems raised by manipulation of the hydrologic cycle are examples of the first-order issues that will arise as man increases his capability to modify the weather.

Three problems of the hydrologic cycle need serious study. First, there is the downwind rain shadow: When rainfall in one area is increased, there clearly must be a leeward area where the rainfall will be appreciably reduced. Second is the problem of total rainfall alteration: If we learn how to ameliorate severe storms, we must face the fact that such storms, even though damaging, are responsible for bringing to a region an appreciable proportion of its annual precipitation. Third, there is the toxic nature of the chemical materials employed for cloud seeding: It might be argued that the use of silver iodide involves spreading such small amounts of silver ions over such large areas that toxic levels of silver are never attained. Indeed, the evidence now in hand suggests that this is the case. But because the transactional networks in the ecosystem tend to lead to concentration as material flows through the hierarchy, one cannot be certain that there will not ultimately be concentration of silver within the biosphere. The remarkable concentration of biocides within hierarchies of organisms supports this view and suggests that serious attention should be directed to the biogeochemistry of silver.

Holding His Destiny in His Hand

Taming the weather can be a dangerous game. There may be gains for human welfare from achieving some control over the weather. At the same time, there are some imponderable ecological



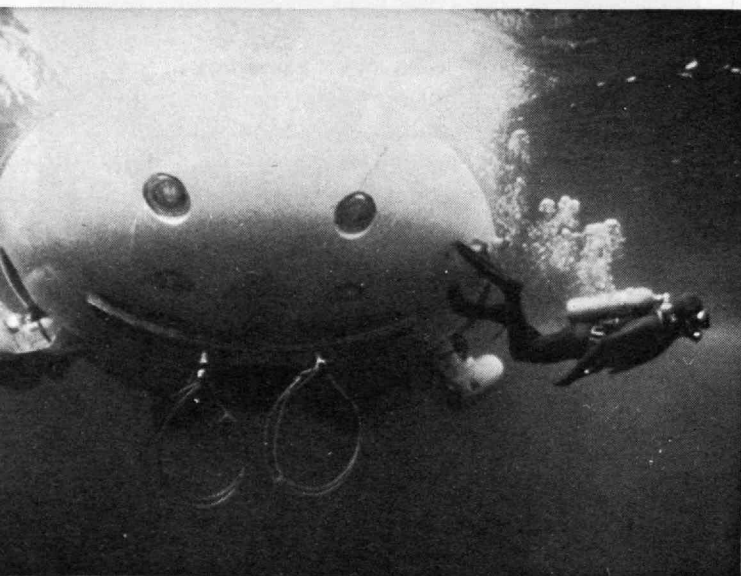
risks. Because man is as much a species of the biosphere as any other organism, he must critically evaluate these gains against the risks. He must undertake ecological studies that will allow him to anticipate the consequences and implications of conscious weather modification for the biosphere. In a real sense he holds his destiny in his own hands.

Dr. Frederick Sargent II studied biology at M.I.T. (S.B., 1942) before entering the Boston University Medical School (M.D., 1947). Thereafter he was associated with the Department of Physiology and Biophysics at the University of Illinois for 18 years before assuming his present post at the University of Wisconsin (Green Bay) in 1968. He is a member of the National Air Quality Criteria Advisory Committee, a member of the Executive Committee of the U.S. National Committee for the International Biological Program, and Chairman of the Committee on Human Ecology of the Ecological Society of America. This article is adapted from a paper presented at the First National Conference on Weather Modification of the American Meteorological Society.

"We've got to sto

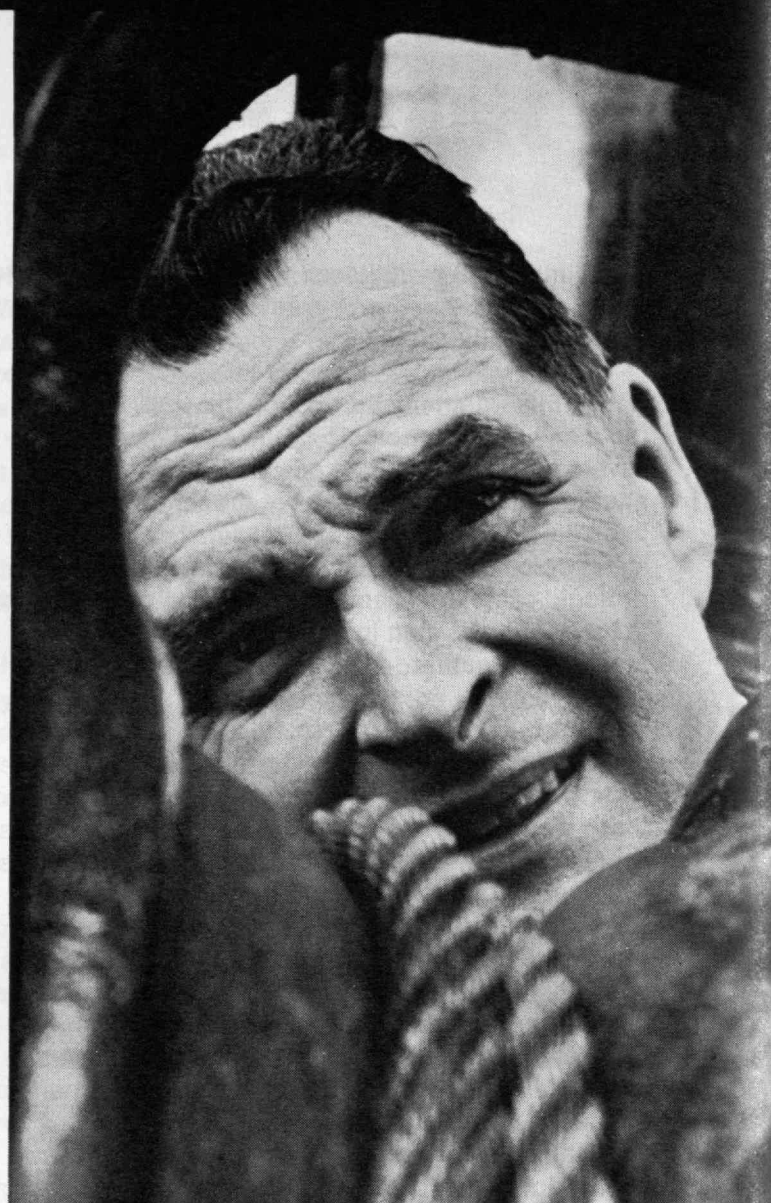


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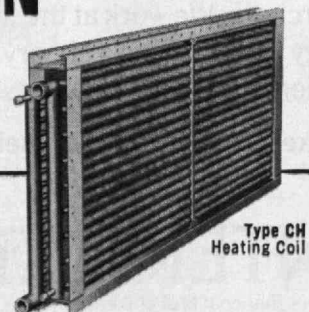
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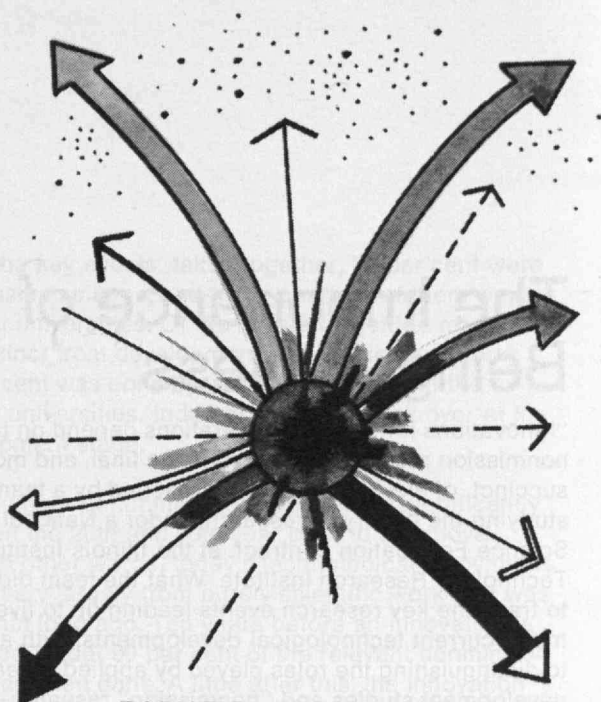
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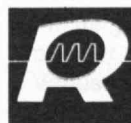
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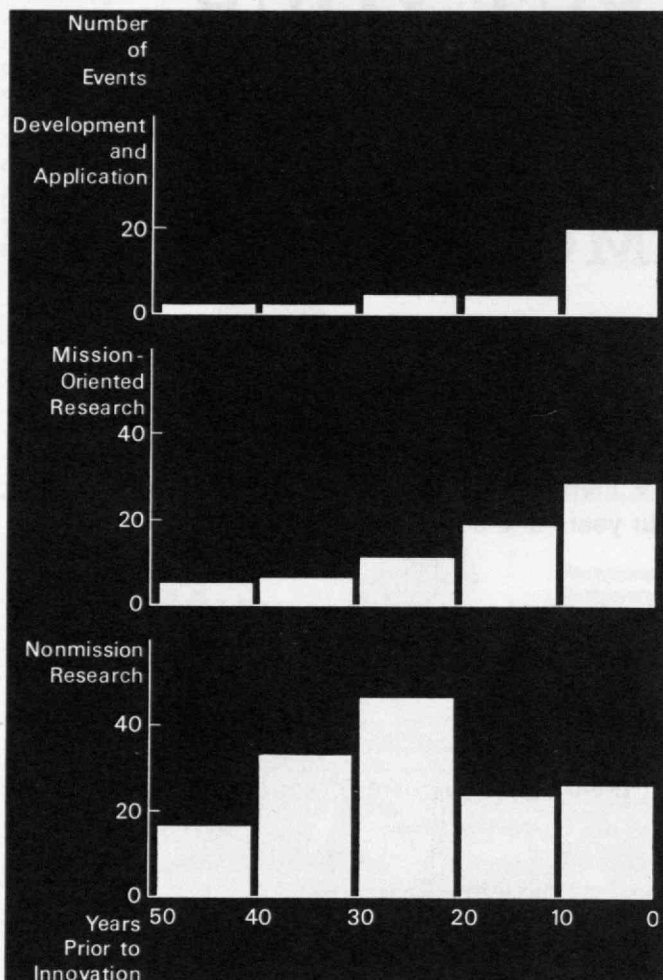
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Trend of Affairs



Key events in the ancestry of five major technological innovations were divided into the three categories shown here. This plot demonstrates the practical value today of the pure science of 30 years ago.

The Importance of Being Aimless

"Innovations for the next generations depend on today's nonmission research." Thus runs the final, and most succinct, of eleven conclusions reached by a team studying the history of research, under a National Science Foundation contract, at the Illinois Institute of Technology Research Institute. What the team did was to trace the key research events leading up to five major current technological developments, with a view to distinguishing the roles played by applied research, development studies and "nonmission" research—that is, "the search for knowledge and scientific understanding without special regard for its application."

The five topics chosen were magnetic ferrites, the video tape recorder, the oral contraceptive pill, the electron microscope and the matrix isolation technique (for observing the mechanisms of chemical reactions). In each case, the scientists agreed without much difficulty about which were the major antecedent discoveries and developments, and classified them as nonmission, mission-oriented or development "on the basis of their technical content and motivation."

The histories are presented in the form of networks. There are, as would be expected, marked differences between them. It is probably no surprise that the story of matrix isolation is told entirely in terms of nonmission research, but in this respect magnetic ferrites and the electron microscope do not look very dissimilar. The one that seems to owe least to disinterested curiosity is the video tape recorder; but there the cascade of relevant applied research that took place from the 1920's onward owed a great deal to the growing background of scientific findings on ferromagnetism. The oral contraceptive network shows that, up until about 1950, the pill's ancestors are almost entirely traceable to nonmission work on hormones, steroid chemistry and physiology of reproduction. Of these first-glance impressions, the last particularly echoes the scientists' general conclusions.

In all cases, they found, "nonmission research provided the origins from which science and technology could advance towards the innovations which lay ahead."

Of all the key events, taken together, 70 per cent were nonmission science, and three quarters of them were done in universities. Of the mission-oriented research (as distinct from development and application work) 54 per cent was done by industry and most of the rest by universities. Industry of course took over at the development stage.

"The number of nonmission events peaks significantly between the 20th and 30th year prior to an innovation." In other words, today's technological innovations spring very largely from purely scientific work that was done that long ago. Ten years before an innovation is achieved, about 90 per cent of the relevant nonmission work has been done. A little after this, the innovation itself is first imagined. ("For the cases studied the average time from conception to demonstration of an innovation was nine years.")

During these remaining years, nonmission research still has an important part to play, the I.I.T.R.I. team also conclude. The interplay between the different types of research is "sometimes even crucial during this terminal period." A related conclusion is that we need a better understanding of the interaction between science and technology. The team found that some key nonmission studies had been sparked off by previous applied research.

The main lesson is, clearly, that to cut back on all current research that is not aimed at specific payoffs would be to deprive the next generation of the scientific ground on which it will build. "Insofar as one can generalize . . . the bulk of nonmission research is completed without insight into the conception and innovation to which it will ultimately contribute." This conclusion, it should perhaps be emphasized, relates to nonmission research which had demonstrably contributed. And not only is it true to say that the uses of yesterday's science were not foreseen. Many of them were simply unforeseeable: for example ". . . the merger of the relatively mundane development of cathode ray tubes with the newly developed quantum theory and dualistic conception of nature to stimulate the electronic analogy of the microscopic."

The report of the I.I.T.R.I. team contains a number of intriguing suggestions. For instance, if at the time of conception of an innovation it is possible to make an

enlightened guess at the proportion of the relevant research that has been done already in the various categories (nonmission, and so on), we can perhaps estimate "the *relative* proportion of activity levels for each research category to achieve innovation in a timely fashion."

The idea that nonmission research must carry on, aimed at no particular goal, does not go unqualified. "An analysis of needed innovations to determine their characteristics can help to identify key blocks of knowledge which *might* contribute to innovation." For example, early in the history of magnetic ferrites it might have been realized that advances in crystal chemistry were going to contribute. The study also illustrates the fact that certain lines of research have been applied repeatedly in many fields.

Radar and the New Planetary Astronomy

Man's knowledge of earth's planetary neighbors has reached a new level of accuracy and detail as a result of the rapid development and use of earth-based electronics. Indeed, said Thomas Gold, Director of Cornell University's Center for Radio Physics and Space Research, at the 1968 meeting of the American Association for the Advancement of Science this winter, radar has given man "a completely new way of investigating the planets" and hence a new approach to the major problems of how the planets were formed and what happens on them.

The precision of planetary measurements has increased by many orders of magnitude even since 1961, said Dr. Gold—so that, for example, the distance from earth to Venus is now known with an error of less than the height of Mt. Everest. This simply means that if a major mountain range came into radar view on Venus we could detect its presence—even though that planet is permanently shrouded in cloud. Though techniques are not yet fully developed, we are already able to recognize by radar some permanent surface features of Venus; and, Dr. Gold said, we can foresee the early use of radar to map the Venusian surface to a

"The study of the earth in its planetary setting has undergone a revolution," said Frank Press, Head of the M.I.T. Department of Geology and Geophysics, in opening a symposium session on "Earth as a Planet" before the A.A.A.S. in Dallas in December. Thomas Gold of Cornell University (on Professor Press' left) spoke specifically of a "wholly new range of planetary information" now available from radar observations. Also on the platform (left to right): William B. Heroy, Jr., Vice President of Teledyne, Inc.; Harrison Brown, Professor of Geochemistry at California Institute of Technology; Wilmot H. Hess of the N.A.S.A. Manned Spacecraft Center; Don L. Anderson, Director of the Caltech Seismological Laboratory; and Mark Landisman, Professor of Geophysics, Southwest Center for Advanced Studies.



resolution of about 5 kilometers. When this goal is achieved, he said, man will for the first time know if there are mountains or oceans on Venus.

Radar has already led to one remarkable finding about Venus through the accurate measurement of its orbit and rotation. Venus turns on its axis in a retrograde way, and—like the moon—it presents only a single side to earth. This dominance of earth's tidal influence over that of the sun on Venus is a "remarkable" observation, said Dr. Gold, and we can theoretically contrive only one particular set of circumstances which could place Venus in the motion we observe: the planet must have gradually slowed from a more rapid retrograde motion; there must be some permanent deformity in the planet's mass distribution; there must be internal energy dissipation, presumably from a liquid core; and there must be an atmospheric tide, to account for the stability of the planet's motion.

Similarly, radar observation of Mercury—hard to observe visually because it is so close to the sun—has revealed that this planet, too, is not in the predicted synchronous solar orbit. Mercury's motion can only be explained by the presence of internal discontinuities, and thus theory belatedly is revised to conform to new observational data.

Three radar observatories are responsible for giving us this "wholly new range of planetary information," Dr. Gold told the A.A.A.S.—the Arecibo Observatory of Cornell University in Puerto Rico, the Haystack radar of M.I.T.'s Lincoln Laboratory, and the Goldstone antenna operated by the Jet Propulsion Laboratory of California Institute of Technology.

Rip Van Winkle and the Future Ministry

Gloom over the "financial crisis" in American science (see p. 59) was accompanied at the 1968 A.A.A.S. meeting in Dallas by an intensive and apprehensive review of U.S. science policy—if it is, what it is, and how to make it work better. The easy conclusion was that science in its rapidly growing size and influence has indeed outrun the instruments designed to study its needs and provide for its outcomes. But the harder question remained: given its size, complexity, and interrelationships, can any form of government really cope with the priorities and implications of modern science?

Donald F. Hornig, concluding his service as Special Assistant to the President for Science and Technology, told the A.A.A.S. members in Dallas that in his view "we have the correct basic ingredients for government participation in scientific and technological problems and policies." But he admitted that the principal element of this machinery, the Office of Science and Technology which he headed as Assistant to the President, needs considerable strengthening so that it can in fact take more of the burden of decision-making from the President.

O.S.T., said Dr. Hornig, should have additional systems analysis capabilities to study various problems and their intereffects, and it should have a clear responsibility for evaluations and planning so as to make current projections of possible futures. Given additional staff



U.S. science faces "a loss of confidence," said J. Herbert Hollomon, President of the University of Oklahoma, at the 1968 meeting of the A.A.A.S. in Dallas. He called for a new cabinet-level Department of Science and Technology whose central purpose would be to "understand and develop science in the service of man. I believe every nation," he told a televised session of the convention, "must develop a format for understanding its priorities and for advancing its science to meet its needs."

and physical resources, he said, O.S.T. should make an annual report on the state of U.S. science and technology. O.S.T.'s role should be to answer such difficult questions as the effect of various ways of supporting higher education—block grants, building funds, specific research contracts—on the future needs of the universities and the country; how many graduate schools, and how many graduate students, we really should have; what were the trade-offs between going to the moon and other scientific enterprises which could have been supported with the same funds.

The nature of these assignments—and of the power structure in Washington—means that this science policy planning agency should have a budget of at least \$2 billion, Dr. Hornig said.

James A. Shannon, former Director of the National Institutes of Health, made a similar plea in a special "distinguished lecture" to the A.A.A.S.: decisions that influence program development in science and education and in the use of science for other social purposes, he said, are so important that they should be made at a level "no lower than that at which the National Security Council and the Council of Economic Advisers operate."

Dr. Shannon described his outline for a new super-planning agency with which to diminish "the chaotic competition for research and development funds among the major areas of scientific endeavor, between the needs of research and education." Priorities could then be considered, he said, "in relation to broad social needs and national purpose" so that the U.S. could have "a clearer expression of our national purposes in the pursuit and utilization of new knowledge."

Patrick McTaggart Cowan, Executive Director of the Science Council of Canada, went straight to the point: U.S. policymaking is not yet geared to anticipate problems. "Why didn't your policies anticipate the urban problems before they became a crisis?" he asked.

What most countries really need, said Alexander King, Director for Scientific Affairs of the Paris-based Organization for Economic Cooperation and Development, is a Minister of the Future who can be made responsible for a grand strategy for science, economics, and development.

But there were words of caution, too. J. Herbert Hollomon, President of the University of Oklahoma who formerly headed the Office of Science and Technology in the U.S. Department of Commerce, warned of the "extraordinary danger of compromising and stifling innovation and creativity in the central planning of science." And Conrad H. Waddington, Head of the Department of Genetics at the University of Edinburgh, Scotland, wondered whether the existence of such a powerful across-the-board planning group was consistent with a democratic government.

Yet recalling his recent experience as a member of an O.E.C.D. study committee on U.S. science policy, Dr. Waddington said the principal problem for U.S. science is "to re-establish confidence in its relations with those organs of society which control funds." To do this, he said, will require "a much improved machinery for considering in the broadest terms what are the real needs of society today, as well, of course, as machinery for implementing any consensus that is reached.

To which Don K. Price of Harvard University, President of A.A.A.S., had the last word: "If I had, like Rip Van Winkle, gone to sleep a century ago, I would have awakened today with the expectation that scientists would want to keep their own counsel. And I would be astonished to find scientists insisting on free and open relationships with Congress and the people."

A winter snowstorm failed to hide the simplicity of M.I.T.'s new radio telescope for studying pulsars in Middleton, Mass. Sixteen wooden structures carry chicken-wire parabolas with antennas mounted above them—the whole array interconnected to recording and computing equipment. When completed late this month the instrument will have cost about \$20,000. (Photo: Joseph J. Burbage, Jr., from Tech Engineering News)

Light Pollution?

The amount of time we spend these days under artificial lights may be doing more to us than keeping us out of the sunlight. According to Richard J. Wurtman, Associate Professor of Endocrinology and Metabolism at M.I.T., excessive exposure to artificial sources of light could be harming our glandular systems. At present, he wrote in *Hospital Practice* in January, scientists have no means of knowing whether such harm, which he termed "light pollution," does exist or not, since no research is underway on the problem.

The possibility of light pollution arises because light has at least one route through which it can influence our glandular systems, Dr. Wurtman explains. A small proportion of the light reaching our eyes is diverted via the brain to the pineal gland. This bony nub of tissue near the center of the brain was once believed to be a vestigial organ in mammals, although in lower vertebrates such as frogs it functions as a third eye. However, scientists have recently discovered that, through the light it receives, the gland influences the amount of the hormone melatonin in the body (see *Technology Review* for March, 1968, page 23).

Melatonin regulates the activity of a number of glands in the body, including the sex glands. Thus, through a pathway that involves the eyes, the brain, the pineal gland, and the production of melatonin, light has a direct influence on such bodily processes as the onset of sexual maturity and the menstrual cycle in women. Most of the studies on this chain of influence have been on animals, but a recent survey of 500 blind girls, which revealed that they reached menarche a year earlier on average than girls with normal sight, showed the influence of light in humans.

In his article in *Hospital Practice*, Dr. Wurtman expressed concern that the quality of light might be a critical factor in such influence. Artificial light from fluorescent lamps and incandescent bulbs has an entirely different spectrum from sunlight, he said, and may thus influence our bodies in a different way. Dr. Wurtman called upon scientists to mount a research effort into the possibility. Perhaps there will be no effect, he said, but someone should try to make sure.

—Peter Gwynne

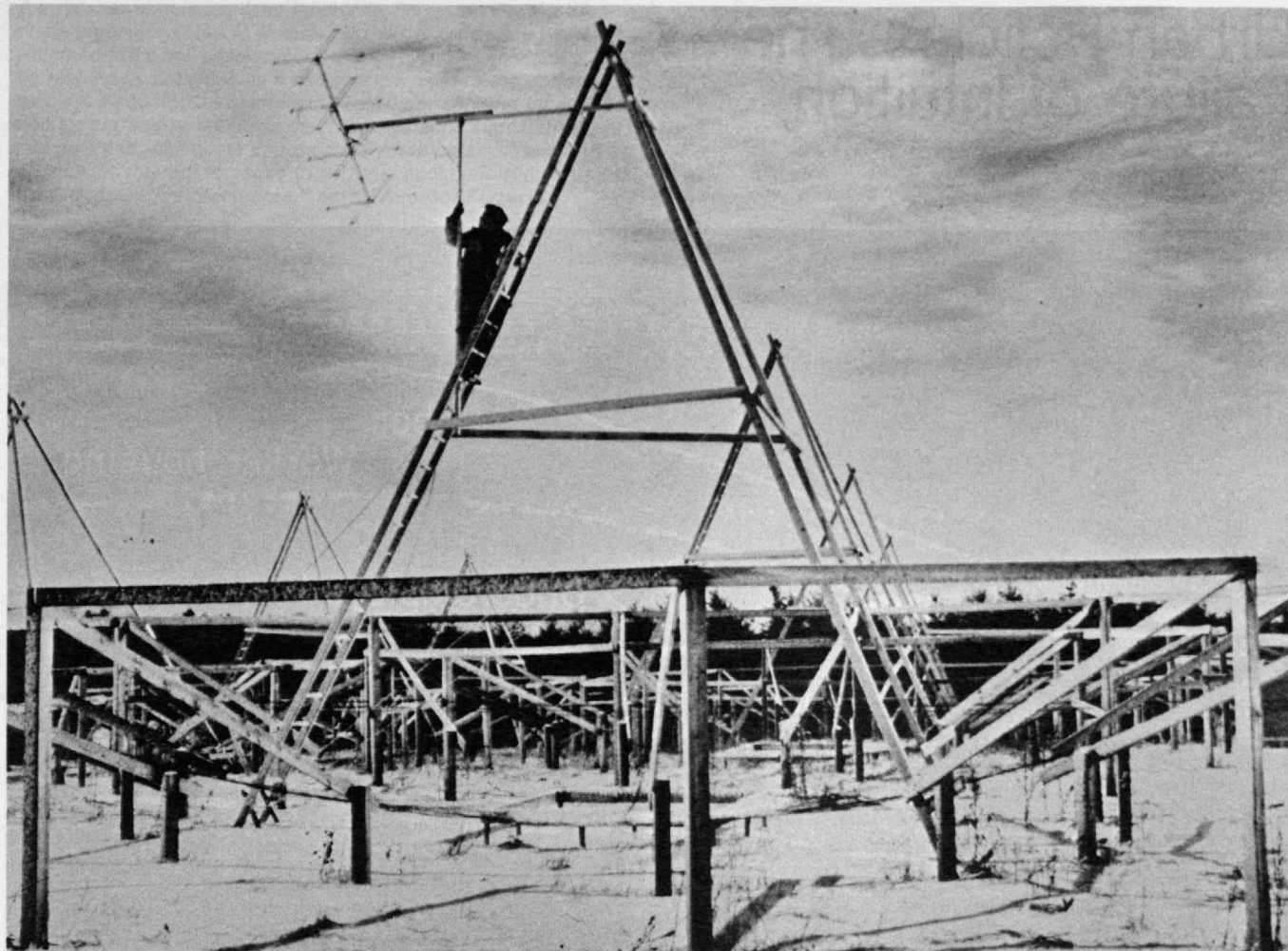
Ten-Yearly Burn Keeps Rice Growing

"Slash-and-burn" is the graphic name for one method of preparing forest or brush land for planting grain. It is a drastic treatment, and naturally, ecologists are at work on the extent to which it causes lasting damage by destroying roots and soil fungi and exposing the soil to erosion. California, where slash-and-burn clearing has long been popular, is also the home of much of this research on its ecological effects. *Science News* for January tells how one California researcher made an expedition to the hills of Thailand and discovered that the locals were at least a millenium ahead.

The Lua, as they are called, have lived at least that long with the problem of how to get an adequate rice harvest in the face of rapidly growing forest. The village that was studied uses 3000 acres of the forest, 300 acres at a time. Each year, before the monsoon, one-tenth of the forest is cut down and dried. It is then burned, in a very skillful fashion that removes the growth without overheating organic components in the soil. Tree trunks are laid flat, at right angles to the hill's slope, to prevent soil erosion if the rains come too early. Rice is planted in the ashes, and as it grows, its roots take over the work of retaining the soil.

The California researcher, Dr. Paul J. Zinke of the School of Forestry at Berkeley, says that the villagers have to work fast to get the rice harvested before the forest takes over again. Afterwards the forest is simply left to grow, and the next year the Lua farmers move to the next 300 acres. In ten years they are back to their starting ground, which by that time has recovered. In over 1000 years, they still have "stable, fertile, and uneroded" soil.

Dr. Harold Biswell, also of the Berkeley School of Forestry, comments that periodic fires such as the Lua employ have long occurred naturally in California. The natural ecology thus owes something to the frequent burning away of dead and diseased plants. If fires are prevented, this material accumulates, so that when a fire eventually breaks out it is likely to be extremely hot and do lasting damage. Thou shalt not kill; but needst not strive officiously to keep alive.



New Looks at Pulsars

Two new chapters have been written in the search for pulsars, the postulated "neutron stars" whose discovery was a principal scientific event of 1968 (see *Technology Review* for January, pages 44-45).

The location of NP 0532, one of two pulsars first sighted from Green Bank, W. Va., by David H. Staelin, Assistant Professor of Electrical Engineering at M.I.T., and Edward C. Reifstein, 3d, of the National Radio Astronomy Observatory, has now been confirmed: it is in fact in the Crab Nebula—and this confirmation lends power to the "neutron star" explanation. (NP 0527, another pulsar also first observed by the two, is nearby—but not in the Crab.)

To move nearer home its exploration for pulsars, the M.I.T. Department of Physics is now completing a remarkably simple yet powerful radio telescope of its own in Middleton, Mass.—a practical demonstration of "doing cheap science," says Bernard F. Burke, Professor of Physics.

The M.I.T. telescope consists of 16 parabolic 50-foot-diameter "dishes" made of wood and chicken wire, distributed in a square array across one acre of land. Above each dish, on a 23-foot wooden tripod, is mounted an antenna on a moveable arm, and the

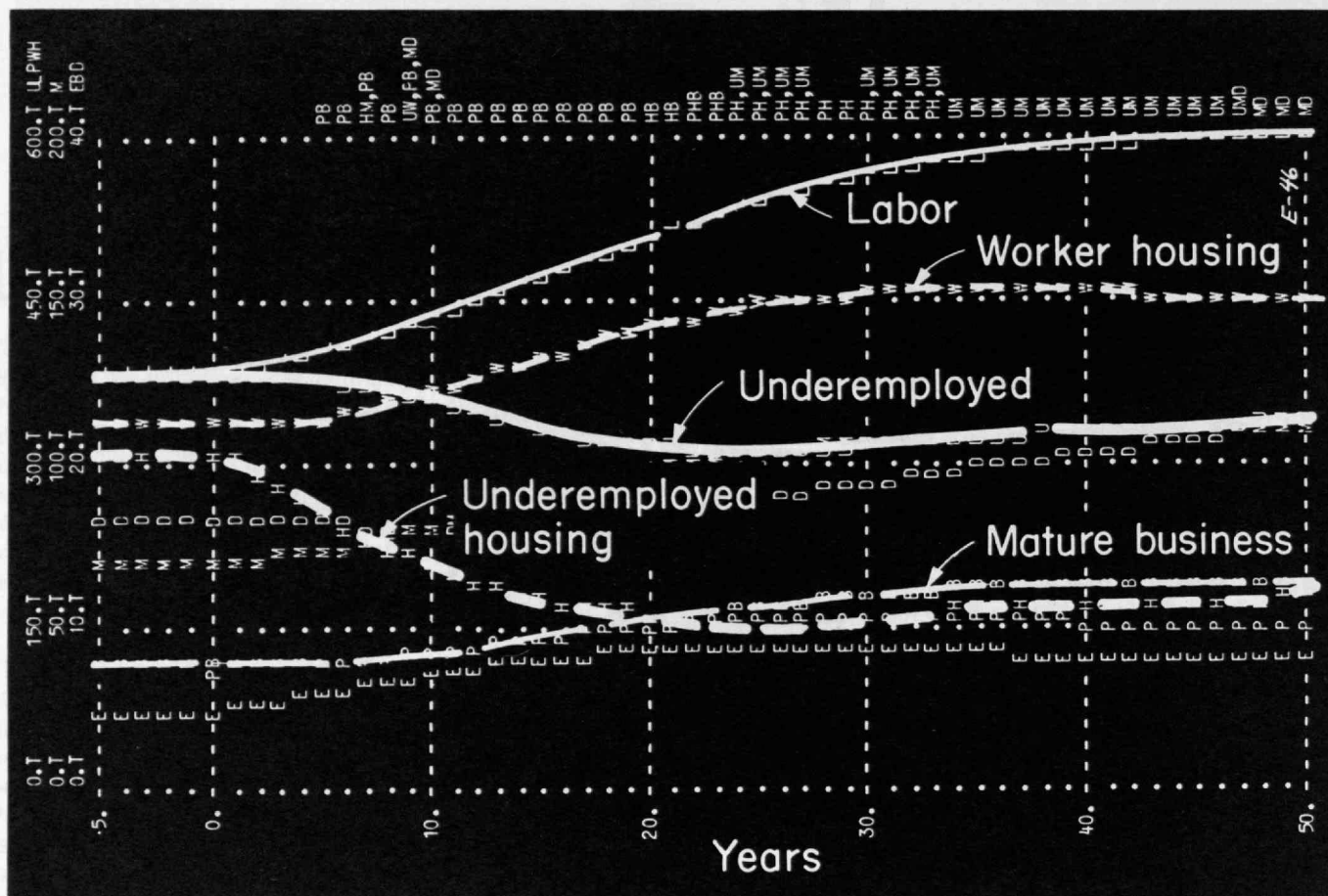
antennas are all connected into central recording equipment. By moving the antennas, scientists will be able to make the telescope cover 80° of the sky—40° above and below the zenith. Later, Professor Burke and his associates hope to connect the site directly by telephone to M.I.T. computers so that "real-time" data will be available.

The whole array—the cost of which will be about \$20,000, provided by the National Science Foundation—will be comparable at the low frequencies for which it is designed (150 to 300 Mcps.) to any other radio telescope in the world.

The M.I.T. project began with studies late last spring by graduate and undergraduate students, and several undergraduates went on the Physics Department payroll to do much of the construction during the summer. Details are now being completed, and the observatory will be "on the air" before spring.

Meanwhile, NP 0532 has been back in the news. Three University of Arizona astronomers discovered in January that visible light comes from it in pulses which have the same rhythm as the radio pulses which first led to its discovery. Later astronomers at the University of Rochester reported that the period of NP 0532's flashes is increasing by 3.64×10^{-8} seconds per day—just as the period of its radio signals is increasing.

Urban Policies: The Failure of Intuition



An urban ghetto is a "complex social system," and complex systems cannot be explained or changed by the same intuitive methods which work in simple systems. "Programs for correcting the weaknesses in our social systems are too often based on judgment and intuition. But intuition is misleading in deciding policy for complex systems . . ." said Jay W. Forrester, Professor of Management at M.I.T., to an alumni meeting at M.I.T. late last year.

"Our intuition and judgment," Professor Forrester said, "are developed from earliest childhood in simple systems where cause and effect are clearly related.

"But in complex systems causes may be remote in both time and location from the symptoms. Complex systems behave in quite the opposite way from simple systems. The solutions which work in simple systems will often make the troubles worse in complex systems."

Professor Forrester begins with a simulation model which shows how the difficulties in a social system are created. Only if the causes are known can the causes be eliminated. "If causes remain and we only attempt to suppress symptoms," he emphasizes, "the result is to create greater internal stresses."

Professor Forrester summarized results of a unique study of the dynamics of urban systems. His principal conclusion: "To understand present failures in urban management, we must see the urban decay process as part of a large, dynamic social system."

Dr. Forrester's results indicate that many of the popular programs such as job training, financial subsidies to the city, government created jobs, and low-cost housing can only intensify the low standard of living and unemployment in a stagnated urban area.

Instead, the directions for urban revival are very different. The basic problem is an economic imbalance produced by two simultaneous effects: falling employment in aging commercial structures, and increasing population density in aging housing structures. Re-balancing of economic opportunity and population requires a gradual and continuous removal of old residential structures with favorable regulations to encourage commercial activity having high wage rates and high employment for local residents. "To maintain economic balance, availability of housing should be used to limit population," says Professor Forrester, "in contrast to the present practice of limiting population by controlling work opportunities."

A computer simulation used by Jay W. Forrester, Professor of Management at M.I.T., to analyze the dynamic social system which controls the development of a city, shows how a city can be revived by demolishing 5 per cent per year of the under-employed housing and increasing by 40 per cent the inclination for starting new enterprise. The simulation shows that "as men and jobs come approximately into balance, a series of changes interact to cause the normal economic forces to start regeneration of the area," says Professor Forrester.

Crisis of Confidence

How serious is the "financial crisis" facing U.S. science? Is the reduced federal support of education, research and development a national catastrophe, or could it be a thickly disguised blessing?

No one attending the year's most important general convention of scientists—the 1968 annual meeting of the American Association for the Advancement of Science in Dallas this winter—could doubt that there is a "crisis." The second question was harder to answer, though a good many prestigious spokesmen for science attempted it.

Most of the answers amounted to special pleas for special problems. H. Bentley Glass, President-Elect of the A.A.A.S., stressed the side-effects of the science funding cuts—the reduced support through reduced overhead payments for computers and information-retrieval systems, libraries, publications, and professional societies. "What is the good of producing new information if we are forced to depend on the most primitive methods of storing and communicating it?" he asked.

Roger Revelle, Director of the Harvard Center for Population Studies, noted the "disastrous effect" of cut-backs on international programs, including especially the Fulbright grants to send U.S. scientists abroad and foreign scientists to American laboratories. Among the casualties of the "mindless slashing of budgets," he said, was a possible breakthrough in American relations with Communist China; Dr. Revelle suggested, though he did not specifically discuss the possibility, that mainland Chinese scientists were moving toward informal communications with their American counterparts overseas.

Harrison Brown, Professor of Geochemistry at the California Institute of Technology, concentrated on other international aspects by lamenting the reduced funds available for U.S. scientists to attend international meetings and the threat, not yet realized, that U.S. participation in various international scientific unions might be terminated.

And Kenneth V. Thimann, Provost of Crown College of

the University of California (Santa Cruz), made a special plea for agricultural science. The National Institutes of Health, he said, had wisely recognized the need to support basic sciences underlying health care as well as the medical sciences themselves. But the basic plant sciences underlying agriculture have not been so generously supported by the Department of Agriculture, and they now face a difficult situation. "We are now cutting down on work which will affect the progress of agricultural resources in the late 1970's and 1980's," said Dr. Thimann, "just when food problems will be most severe."

Philip H. Abelson, Director of the Geophysical Laboratory at the Carnegie Institution of Washington and Editor of *Science* magazine, made a more general argument. Citing the growing prosperity of technologically based industries in many foreign countries, Dr. Abelson declared that the U.S. "is rapidly becoming a 'have-not' nation." We cannot afford to relax about the science and technology gap, he said. "Under these circumstances to abandon support for the physical sciences is senseless."

For a more positive approach, the A.A.A.S. members had to wait for James A. Shannon, the former Director of the National Institutes of Health who is now a Special Adviser to the President of the National Academy of Sciences. Dr. Shannon warned that his comment would carry little comfort: "We talk about democracy," he said, "but American scientists have failed to try to make it work. The days when support for science was a right and not a privilege are over. We have in Congress well-meaning, sensible people, but the only persuasive argument for science in these times relates to its social purpose," Dr. Shannon declared. "We have come to the present situation because scientists have failed to inform their constituency."

Dr. Revelle was quick to agree. "The American people will not rise to a statement by scientists that they deserve support," he said. "We must state in ever-clearer terms the wonder, the joy, the productivity, and the meaning of science to Americans and to the world."

Antarctica: Heat Sink and Nature Preserve

Antarctica, the icy, mysterious continent at the "bottom" of the world, is yielding its secrets. But, like most scientific secrets, they ask more questions than they answer.

Many workers on Antarctic geology, oceanography, and climatology summarized their recent results at a symposium during the annual meeting of the American Association for the Advancement of Science this winter. Among the participants and their reports:

Bruce A. Warren of the Woods Hole Oceanographic Institution: Nearly 60 per cent of the water in the world ocean may be traced directly to the Antarctic, and indirect measurements suggest a northward transport of cold, low-salinity sea water from the Antarctic to the ocean depths of the world which amounts to more than 10 million cubic meters per second.

Henry Stommel, Professor of Oceanography at M.I.T.: While most circular ocean currents show large seasonal shifts in their axes and volumes, the Antarctic current is remarkably stable. Indeed, its variations in both position and rate of flow are so small that present methods cannot dependably detect them.

Lawrence A. Frakes and John C. Crowell of the University of California: The Antarctic has not always been in the earth's polar region, and on at least one occasion it "even approached the equatorial belt of the earth." The primitive continent of Gondwanaland yielded the Africa-South America block some 300 million years ago. The Antarctic-Australia segment was in semi-tropical latitudes some 200 million years ago, then separated—with Antarctica moving to its present polar position about 110 million years ago.

Morton J. Rubin of the Environmental Science Services Administration: The Antarctic has a central role in maintaining the "delicate balance between the incoming radiation from the sun and everything that happens in the earth's atmosphere." For the continent serves as the heat sink of the atmospheric heat engine; if there were no motion in the atmosphere, the Antarctic would

become ever colder and the equatorial regions ever warmer.

A. P. Crary, Deputy Division Director for Environmental Sciences at the National Science Foundation: Further Antarctic studies of the ice sheet and the continental floor will soon enable scientists "to construct a realistic picture of the pre-glaciated Antarctic continent." With this information scientists will be able to determine the most favorable sites for life, and then the continent will be ready for "a new, different kind of scientist, the archaeologist."

But while all this was going on in Dallas, William S. Benninghoff, Professor of Botany at the University of Michigan, was warning scientists that Antarctic life is a fragile ecosystem upon which man could easily inflict irreversible change. Dr. Benninghoff is a member of the committee structure which advises the National Science Foundation on Antarctic research programs; he commended current Antarctic research activities for their careful consideration of the native plants and animals, but he urged that selected areas of the continent which now constitute germ-free environments be specified as "uncontaminated sites not to be entered by people or crossed by low-flying aircraft." In addition, he said, some Antarctic valleys, containing micro-organisms found nowhere else on earth, should be set aside to ensure that they will not be contaminated before their unique biological systems can be fully studied.

A Many-Sided View of Vitamin A

Vitamin A is an essential contributor to our bodily well-being. Yet, although the vitamin was first identified by British scientists early this century, it is still something of a mystery to scientists. Its functions in the body, apart from a role in vision brilliantly elucidated by Harvard's George Wald in Nobel prize-winning work, are poorly understood.

And the mystery goes deeper: even the extent and effects of deficiency of the vitamin are matters for conjecture. Scientists attending an international symposium at M.I.T. late last fall set out to put some order into the vitamin A picture, consolidating established lines of research and seeking new approaches to the functions of the mystery vitamin.

The body does not synthesize vitamin A and must obtain its supplies from such sources as milk, animal fats, and vegetables. These supplies from outside are stored in the liver, whence they make their way through the blood stream to various sites in the body.

One important clue to the vitamin's action in the body was provided at the symposium by DeWitt S. Goodman of Columbia University, who reported that he had identified a small protein which carries vitamin A

Making Enzymes— Ways for the Future

Chemists have, for the first time, synthesized a complete enzyme in the laboratory. Two groups succeeded in the complicated synthesis simultaneously—Dr. Robert C. Denbowater and Dr. Ralph F. Hirschmann of Merck Sharp and Dohme in Rahway, N.J., and Professor Robert Bruce Merrifield and Dr. Bernd Gubert at New York's Rockefeller University.

All enzymes are crucial to the life processes. They speed up particular chemical reactions in living organisms.

through the bloodstream. This is the first identification of how the vitamin moves from its storehouse in the liver to other centers in the body.

The most obvious symptom of vitamin A deficiency is deterioration in eyesight. Night blindness comes first, and if the lack remains severe this can extend to true blindness. Since the placenta acts as a barrier to the vitamin, such effects are often observed among children in underdeveloped countries.

In these circumstances, however, the effects attributable to vitamin A deficiency are generally masked by those deriving from other aspects of hunger. However, scientists at the meeting were astonished at a report from the Strangeways Research Laboratory in England of a fascinating human laboratory for the effects of vitamin A deficiency.

The man in question is an epileptic who, after reading a popular science article, concluded quite erroneously that his epilepsy would be cured if he removed vitamin A from his diet. Starting in 1963, he has been on a rigorous vitamin-A-free diet, despite scientific assertions that he has it all wrong. Just about now, the Strangeways group reported, his eyesight is becoming very poor, but he has in fact had no epileptic fits since he started the diet and so is determined to continue the experiment. The fact that five years were necessary before deterioration of eyesight set in, commented George Wolf, Associate Professor of Physiological Chemistry at M.I.T., says a lot for the body's ability to store up the vitamin.

Such ready-made guinea pigs are very unusual, and most of the work on vitamin A function must progress through animal studies. According to Dr. Wolf, the overall view which emerged from the symposium was that the vitamin probably has a variety of functions in the body. The view of many researchers now is that the vitamin acts like a hormone, which has to be acquired from the diet. The liver, where it is stored, acts like the endocrine "gland" from which it is released as it is needed.

Apart from its documented role in vision, says Dr. Wolf, the vitamin appears to function in bone growth, in reproduction, by regulating both the production of sperm and the development of the embryo, and in the maintenance

The structure of the synthesized enzyme, which achieved in a laboratory laboratory, should be a satisfactory model for the natural enzyme. Made first of the synthetic units, it is a long chain, which holds the molecules in shape.

of epithelial tissue, by preventing excess keratinization and promoting secretion of mucus.

Following the conference, said Dr. Wolf, the impression is that vitamin A research priorities will swing from particular enzymes to studies of its role of the vitamin as a hormone-like substance, in particular, of the vitamin's control and regulation of the synthesis of certain proteins.—Peter Gwynne

Crystals of Life's Blueprint-Reader

Two molecular biologists at M.I.T. have taken a vital step towards understanding how proteins are manufactured in living cells, by crystallizing for the first time the substance known as transfer RNA. Simultaneously, a group at the University of Wisconsin reported similar work on the same substance. The Wisconsin paper follows the M.I.T. report in the same issue of *Science*.

Transfer RNA is the link in the protein-building chain which translates the language of the genetic code into the particular sequence of building blocks which produces one protein rather than any other. The significance of obtaining the substance in crystalline form is that scientists will now be able to analyze it using x-rays, to work out its three-dimensional shape and structure, and gain clues to its role in protein manufacture.

Already Sung-Hou Kim and Alexander Rich, of M.I.T.'s Department of Biology, have run some preliminary tests on the crystalline transfer RNA they prepared; in the December 20 issue of *Science* they reported that the diffraction patterns, with a resolution of 20 Å, suggest that a large part of the transfer RNA molecules may be organized in three layers separated by about 80 Å.

Proteins are synthesized in the cell at sites known as ribosomes. The message that determines which protein is to be produced is carried to the ribosomes from DNA in the cell nucleus by the single-stranded substance known as RNA. Inside the ribosomes, transfer

RNA reads off the message from the messenger RNA and assembles the amino acids which are the building blocks of proteins in the correct order.

Each of the 20 or so amino acids involved in protein synthesis has a corresponding form of transfer RNA to carry it up to the ribosome during protein building. The M.I.T. researchers obtained crystals of the protein initiator—the form of transfer RNA which reads off the instruction to start building a protein.

They report in *Science* that the crystals are very fragile and sensitive to changes in temperature. According to Dr. Kim, they are even sensitive to filter paper fiber, and are stable only around 5°C. Dr. Kim pointed out that he and his collaborator had to learn from scratch how to handle the sensitive solid.

The crystallization is the first step in a process that the M.I.T. biologists hope will yield a 20Å picture of transfer RNA by next year. A three dimensional map of the substance will undoubtedly offer clues to its action in protein synthesis, and possibly produce some new understanding of the role of ribosomes in the process.

Predicting the Prize Winners

It may be possible to predict now whether a colleague or classmate will win a Nobel Prize in the future. In a paper presented at the American Association for the Advancement of Science annual meeting in Dallas in December, Eugene Garfield and Morton V. Malin of the Institute for Scientific Information reported that Nobel Prize winners have total citation counts in *Science Citation Index*—which lists subsequent citations of a given publication—approximately 50 times higher than the average scientist.

"Unusually significant creative work, typified by Nobel Prize winners, is also associated with a continuity factor," the report states: "... The impact is observable over a long continuous period. In addition, prize winners usually have published one or more key papers which

have extraordinarily high and continuous impact." This is, of course, well known—but it is useful to be able to assign numerical measures.

Identifying innovative and creative individuals early in their careers is not merely an academic exercise. "The allocation of increasingly scarce intellectual and financial resources for supporting research could be managed more efficiently with such a prediction tool. Improved ability to spot creative people much earlier in their careers than heretofore will permit a more equitable distribution of the limited resources available."

The study and analysis of bibliographic citations is one of the few objective ways of evaluating a scientist's work. In the past, evaluation and identification of outstanding individuals has been done by subjective peer judgment. Prizes and grants are given as a result of review by a committee or referee. As science grows, it is argued, these committees need the help of objective criteria in making their decisions. The method of counting citations, if used judiciously by committees, could make prize-giving more manageable and equitable. (Perhaps scientists would also feel less compelled to increase the quantity of their publications if they felt there was any likelihood of the quality being measured instead.)

The I.S.I. studied data collected over five years consisting of over 11 million reference citations. Using computer methods, lists of the most frequently cited papers and authors have been extracted. In spite of small errors, the file is now so large that the results are valid within the limits of acceptable statistical error.

The files revealed, for example, that as early as 1961, the 1968 Nobel Prize winners were being cited at a rate significantly higher than that of the average scientist. The rate increased each year prior to the award. There are variations depending on the age and field of the candidate (for instance, there are significantly fewer papers published in physics than in medicine or biology).

In the future, the I.S.I. hopes to use the *Science Citation Index* data bank for a variety of sociological and historical research and to publish annual reports on studies using this material.

Making Enzymes— Ways for the Future

Chemists have, for the first time, synthesized a complete enzyme in the laboratory. Two groups succeeded in the complicated synthesis simultaneously—Dr. Robert G. Denkwalter and Dr. Ralph F. Hirschmann of Merck, Sharp and Dohme in Rahway, N.J., and Professor Robert Bruce Merrifield and Dr. Bernd Gutte at New York's Rockefeller University.

All enzymes are crucial to the life processes. They speed up particular chemical reactions in living organisms, with each enzyme performing a very specific task. The enzyme the chemists created, ribonuclease, is one of the simplest of the 1000 known enzymes and plays the specific role of breaking down RNA (ribonucleic acid) in the cell. Ribonuclease was chosen for synthesis because its molecular structure is precisely known. While both laboratories reached the same results, their methods were quite different. The Merck researchers worked for 18 months to create their enzyme, while the Rockefeller team built a machine which performed the 369 necessary chemical reactions in three weeks. Nature, of course, does it in seconds.

Ribonuclease consists of 124 amino acids linked in a continuous chain. The cysteine units, one of 19 types of amino acids involved in the chain, cross-link to each other, producing the molecule's three-dimensional shape.

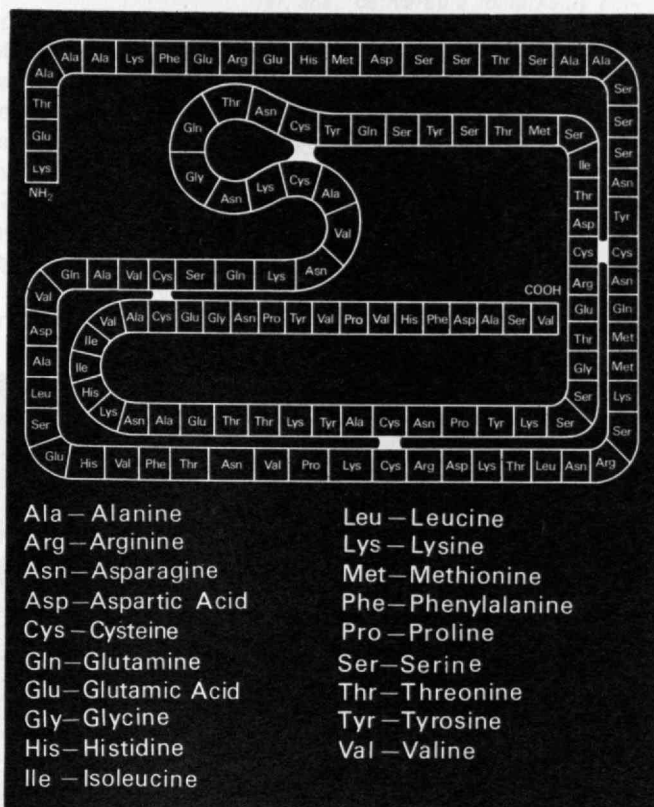
Denkwalter and Hirschmann created a number of small chains which were linked into two large units. When placed together, the fragments showed their self-organizing ability by meshing together to make one enzyme.

The Rockefeller team added the entire chain of amino acids one at a time, starting with a single acid anchored to a bead of polystyrene. When the string was complete the bead was separated from it by adding a chemical, and the chain then curled itself up into the three-dimensional structure.

"This is an extremely significant technique," commented F. Albert Cotton, Dreyfus Professor of Chemistry at M.I.T. "The experiment is important in that it establishes the utility of the technique for future research. Others in the field have created long polypeptide chains, though not an actual enzyme."

The synthesis of ribonuclease is one step further toward the understanding of enzyme activity. In the past enzymes have been isolated from natural sources by very tedious processes, but now it may be possible to create them in large enough quantities for research and medical uses. "This experiment is extremely useful," said M.I.T. Biology Professor Alexander Rich, "because it allows men to study how an enzyme works, and to modify its actions and structure. It may also provide a feasible method for industrial synthesis of certain proteins such as insulin."

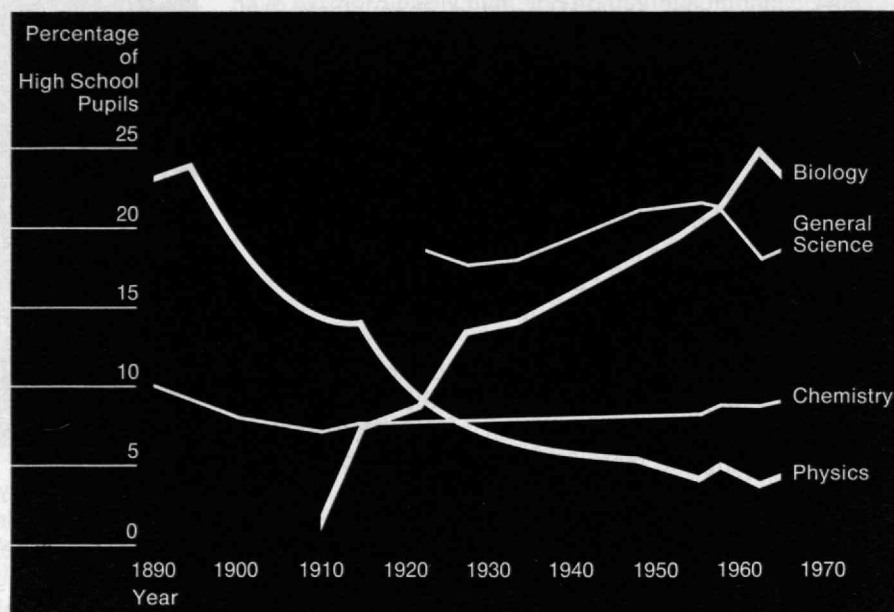
The structure of the synthesized enzyme, the first achieved in a chemical laboratory, shown in a schematic two-dimensional representation. Note that all the cysteine units are involved in cross-links, which hold the molecule in shape.



While enzyme synthesis benefits new areas of research at the present time, it may lead to significant medical uses for enzymes. Already one enzyme, L-asparaginase, is a hopeful drug for treatment of one type of leukemia; another is useful for removing cavity-causing bacterial plaque from teeth.

The techniques developed in the first synthesis of an enzyme are but a step in the long process of understanding and artificially producing the complicated chemicals and chemical reactions which make up the life processes.

For nearly a century high school students have been rejecting physics—and hardly embracing chemistry—while flocking to the life sciences. Arnold A. Strassenburg of the Physics Department of the State University of New York (Stony Brook) used this chart to demonstrate the "flight from science" at the 1968 meeting of the A.A.A.S. (Data: U.S. Office of Education from Offerings and Enrollments in Science and Mathematics)



The Flight from Science

It was in 1699 that Leibnitz wrote to a colleague to lament "the flight from science," and 270 years later scientists are still making the same complaint.

Leibnitz' remark was recalled at the 1968 meeting of the American Association for the Advancement of Science in Dallas this winter by J. Herbert Hollomon, President of the University of Oklahoma, just three hours after a half-day session at which Arnold A. Strassenburg, Director of the Education and Manpower Division of the American Institute of Physics, had reported his conclusion that "there is surely a distressing drift downward in the intensity of interest young people display in science." As evidence of the downward drift he cited the decrease in the percentage of college degrees given in the physical and biological sciences (16.4 to 15.3 per cent between 1962-63 and 1965-66), the relatively smaller increase in mathematics enrollment (44 per cent) compared with overall enrollments (48 per cent) between 1960 and 1965, and a marked recent decrease in engineering degrees (7.7 per cent of all college degrees in 1963 to 6.8 per cent in 1966).

Two speakers at the "flight from science" A.A.A.S. session accepted the thesis and sought to explain its causes. Katherine Swartz, a freshman major in economics and city planning at M.I.T., said students "tend to think of science in terms of a sterile atmosphere filled with test tubes, chemicals, pulleys, and men cut off from society." And, she added, the physical sciences seem to many students "to a large extent centered on creating

destructive instruments and weapons—an impression which does not sit well with the young who are so much involved with the war in Vietnam," she noted.

Teachers received a good deal of the blame. "The lifeless, cold image of science is heightened by the majority of junior and senior high school teachers," Miss Swartz said. Edwin B. Kurtz, Head of the Department of Biology at Kansas State Teachers College, reported that elementary school teachers "teach little or no science in their classrooms," even though science was a required subject in their training. Less than half of the entering college students he surveyed could obtain the sum of 7 and -11, and only one-quarter could construct a bar or point graph from a table of paired events. "Students have not learned to do from their science courses what scientists do," he said; they have little confidence in their science ability, and with this is associated a "negative attitude toward science."

Athelstan F. Spilhaus, an M.I.T. alumnus who is President of the Franklin Institute of Philadelphia and President-Elect of the A.A.A.S., told the meeting that these views of "the flight from science" are too narrow. "We must realize," he said, "that science does not only take place in organized forms," and in its broader sense science and its achievements are more obvious and more widely known today than ever before. "I'm not pessimistic about the flight from science," said Dr. Spilhaus. "We need only to worry about educating our children broadly, putting science in its proper perspective. I'm very optimistic that our young people will then make the right choices," he said.

The M.L.A. Meets the New Left

Annual meetings of academic professional societies generally consist of routine business, research reports, reunions, socializing, and seeking of new jobs. But this winter in Manhattan, the august, 86-year old Modern Language Association (M.L.A.) elected Louis Kampf, a quiet, slight Associate Professor of Humanities at M.I.T., to be its next president.

The election represented a major upset in routine for two reasons: first, Professor Kampf is a co-founder of the New University Conference, a year-old national organization which seeks to involve scholars in political issues; and, second, never in M.L.A. history had the official presidential nominee been opposed. In the wake of his sudden leap into a national forum, the future president (he takes office in 1970) has no mincing words for the M.L.A. or the humanities scholars it represents. "The problem facing the humanities," he summarized, "is how to become human."

Professor Kampf was part of a group of New Left radicals who managed to organize group discussions during the three-day meeting on how to teach non-white students and how to deal with community colleges and junior colleges (traditionally M.L.A. has dealt mainly with four-year colleges and universities) and who succeeded in passing a resolution condemning the Vietnam war. Meanwhile, Professor Kampf himself was arrested after he refused to take down a "radical" poster in the lobby of the hotel where the M.L.A. met. "However," he explained afterwards, "we weren't politicizing the M.L.A.; it is already political to the core. Any institution, *per se*, is political. And I include in that M.I.T., Berkeley, Caltech, Harvard, Princeton, and Yale."

Professor Kampf also criticized the lack of participation by most M.L.A. members, explaining that he had calculated that less than one per cent of its total membership (now some 28,000) had run its meetings, publications,

When Katherine Swartz (left), an M.I.T. freshman in economics and urban affairs, spoke on the "flight from science" at the A.A.A.S. in Dallas in December, she "delivered a remarkably perspicacious analysis of the real situation," said Scientific Research. "The shift in fields of research is not something that should be regarded as bad," said Katherine; "welcome wisdom," said Scientific Research.



and elections, since its founding in 1883. One M.L.A. officer apologized, "I guess we haven't learned yet how to move into the Twentieth Century."

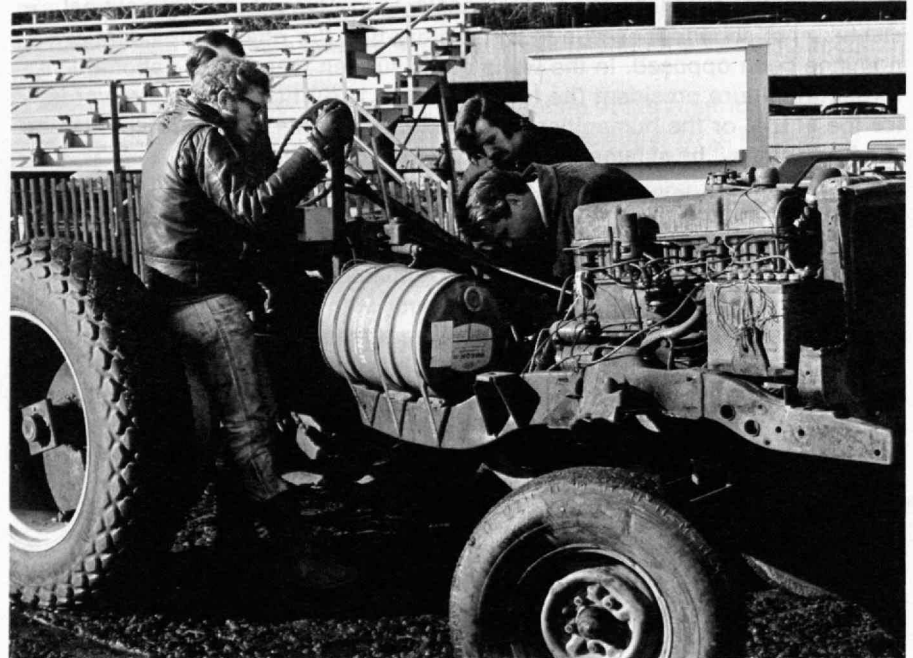
Professor Kampf extends his criticism of the M.L.A. to the general field of humanities as well. "We all think that it is great to have a three- to five-hour weekly teaching load, because it gives us more time to do what we really want, which is to write scholarly papers. But what a terrible decision that is—to favor writing for a very few people over teaching students, who one day may affect many people and many very real problems." A professional association, he believes, "should be a profession's harshest critic." And, under the leadership of this harsh critic, the M.L.A. may start toward becoming just that.

Up with Entrepreneurs

For many, an aging Chevrolet junked by the side of the road is a symbol of the waste and affluence of America. However, to some technologists, who have stripped off its shell, dissected it, and reassembled its parts, it symbolizes the inherent adaptive potential of machinery. Just as sea water can be converted to fresh water, cars can be transformed into inexpensive heavy-duty tractors, says a group at M.I.T.

Under Dwight M. B. Baumann, Associate Professor of Mechanical Engineering, several tractors have been designed which are conversions from American-built cars. A completed prototype, developed by Keshev Chandra of Chandigar, India, and Phillip J. Davis, converts a 1958 Chevrolet into a piece of machinery known as the "Mule"—due to its less-than-sleek appearance. But, the students maintain, their "Mule" can do the job as well as any standard tractor. Moreover, the "Mule" offers kickbacks in labor benefits. If built in India, using unskilled native labor paid less than a dollar a day and elementary welding instead of the products of an advanced capital-extensive economy, reassembly of the junk car parts into a tractor would cost \$650, including the cost of shipping.

"If the tractor were built here, it would cost upwards of \$1,000 because of our labor prices," said Professor Baumann. "However, in India, it performs a useful function on the labor market by offering employment and experience in elemental mechanical skills. This is what I call adaptive technology."



A few simple parts and some elementary mechanical work by two M.I.T. students have converted a 1958 Chevrolet into an inelegant but powerful farm tractor. The same thing could be done in an underdeveloped country—say India—for \$650, including shipping. Dwight M. B. Baumann of the M.I.T. Department of Mechanical Engineering calls it an outstanding example of "adaptive technology."

Professor Baumann said he encouraged such projects to help engineering students learn "entrepreneurship." Entrepreneurship, he said, includes the business ingenuity and management experience needed to use local, foreign conditions and resources for optimal technological development.

Besides the tractor, students have investigated other conversions which would be useful for other nations: a bamboo rice-planter, a motorscooter which functions well on hills and in rural situations, and an eggroll-making machine. Another device is a low-cost plastic injection moulding machine which one Uruguayan student has designed for his home country. Its purpose is to mass produce plastic beer cases and plastic chairs. The reason? Latin American beer originates largely in Uruguay, so mass-produced cases would economize production. Evidently, the possibilities of "entrepreneurship" are infinite.

Candidates and Hardware

Chandler H. Stevens, Jr., former Representative in the Massachusetts State House, began his 1968 campaign for a seat in the U.S. House of Representatives virtually unknown and ended the three-way race in second place. A key factor in his progress during the campaign was the computer. John D. C. Little, Professor of Management at M.I.T. who was a member of Stevens' staff, described to a seminar this winter how the computer helped the Stevens campaign.

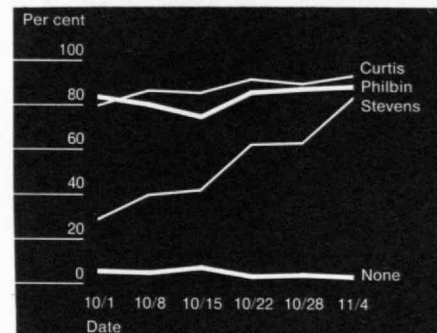
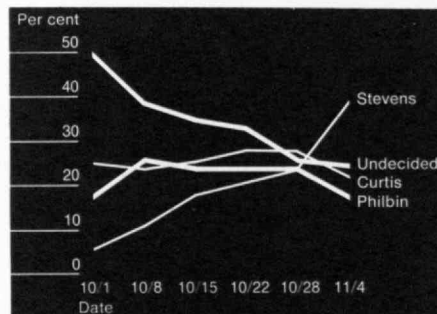
The computer contained a data bank with information about voters, population, parties, and advertising media, statistical programs using this data, and models for processing. It produced a variety of information about the campaign and allowed the candidate to look formally and accurately at problems, including publicity, advertising, fund raising, issues, and voter attitudes. The goal, said Professor Little, was to analyze and control campaign management for greater efficiency and to gain better understanding of the factors affecting the election.

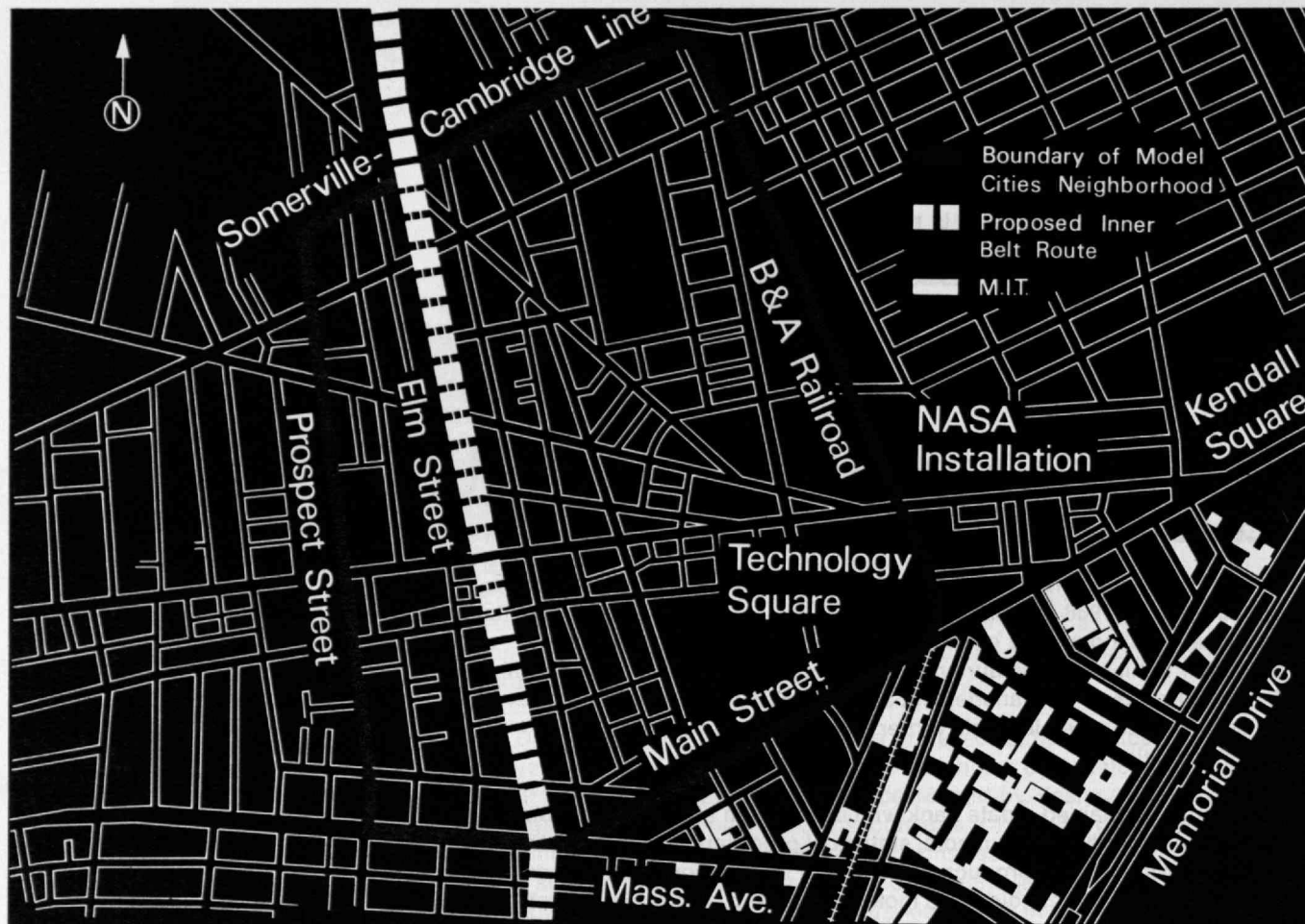
Once Dr. Stevens decided he wanted to run, he had to determine where to direct his efforts. A swing voter model was developed that showed which areas of the district contained the most voters likely to support Stevens. A study of advertising media showed that newspapers and radio were most readily available to the Stevens organizers; television and outdoor advertising were eliminated because of expense and lack of lead time. The rise in voters' knowledge of Stevens in the later surveys demonstrated the success of the advertising campaign while costs were kept to a minimum.

Each week of the campaign, random telephone surveys elicited information on whether voters had heard of Stevens, tested their awareness of issues, and provided a check on the accuracy of the random sample. Computer-analyzed results were on the candidate's desk the following morning.

Finally, although Dr. Stevens (who holds a Ph.D. in economics from M.I.T.) won't be sitting in Congress during the coming years, he will be using his experience in a different occupation. Luis A. Ferré, newly elected Governor of Puerto Rico who is also an M.I.T. alumnus and a member of the M.I.T. Corporation, last month charged Dr. Stevens with feeding new technological and management techniques to the Ferré administration, to help it approach Puerto Rico's problems in an equally logical and creative way.

Computer studies of the Congressional campaign of Chandler H. Stevens. Both graphs, made from data gathered by telephone surveys and analyzed by computers, show the rise in Dr. Stevens' popularity due to effective advertising. The bottom graph shows a marked rise in voter awareness of Dr. Stevens between October 1 and election eve. The other demonstrates that Stevens actually surpassed his opponents in voter preference by the end of the campaign. Dr. Stevens actually won the election in the part of the district where the survey was held.





Molding a Model City

The people: M.I.T. President Howard W. Johnson and 23 local Cambridge representatives, all sitting on the same board and all with equal votes. The place: 268 acres of a depressed neighborhood north of M.I.T. The job: to develop one-eighth of Cambridge via the federal Model Cities program. If all goes well, it will be one of the first community-run federal development programs in the nation.

By an avalanche margin of 18 to 1—a city record—residents of this neighborhood voted to accept the Model Cities program. Approval followed immediately by the Cambridge City Council. As a result, approximately \$1,523,000 in federal funds earmarked by the Department of Housing and Urban Development for Cambridge will be given, in effect, to the neighborhood itself. During the next five years, more than a million dollars in subsequent state and federal funding is expected to go into the 15,000-population area.

President Johnson's job is to represent Cambridge's academic institutions on the board of the Cities Demonstration Agency, C.D.A., the governing body of the Model Cities program. All proposals, which may include dwelling rehabilitation, home-buying aid for families who now rent, and a study of income supplements for the elderly, are subject to ratification by a neighborhood referendum.

As full-time Director of the entire program, C.D.A. chose Gordon Brigham, formerly Assistant Planning Officer for Community Relations in the M.I.T. Planning Office.

While it directs the future of the neighborhood, the C.D.A. will face a

thorny and emotional issue: the Inner Belt. For this spring, new federal pressure is expected in favor of the controversial, eight-lane freeway, the most likely route for which cuts through the Model Cities neighborhood. A proposal which would approve plans for the Inner Belt is now on the desk of the new Secretary of Transportation in Washington, John A. Volpe.

Early in the winter, C.D.A. went on record as "unalterably opposed . . . to any route through the Model Cities area." It also resolved that "if Governor Volpe is appointed Secretary of Transportation, in lieu of congratulations, he be informed of our opposition."

Rats, Kwashiorkor, and Biafra

Joseph C. Edozien, Visiting Professor of Nutrition and Food Science at M.I.T., has a set of professional and personal loyalties which overlap; he is both an expert on malnutrition and he is an Ibo—a member of the African tribe whose homeland is Biafra, the land now fighting a war of independence with Nigeria in which the key weapon is starvation. And during the coming year, Professor Edozien may be one of few specialists privileged to research the effects of malnutrition on human beings by studying Biafran children first-hand.

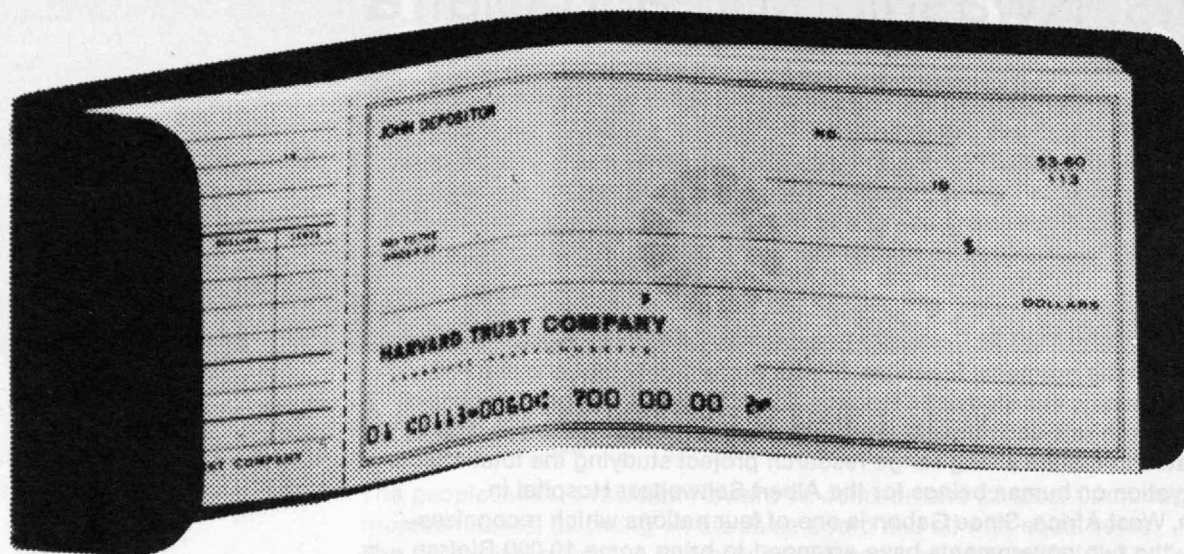
During his year at M.I.T., Professor Edozien has tested the endocrine changes in the hormonal functions of both protein-deficient and starved rats. Eventually, this study can lead to understanding the genetic implications for both rats and humans. And, last month, Professor Edozien was requested to outline a long-range research project studying the total effects of starvation on human beings for the Albert Schweitzer Hospital in Gabon, West Africa. Since Gabon is one of four nations which recognizes Biafra, the two governments have arranged to bring some 10,000 Biafran children suffering from kwashiorkor (the disease associated with protein deficiency) and starvation to Gabon for treatment and study. He explained that the study will include tracing the children of these children to find possible genetic effects.

While in Cambridge, Professor Edozien has also raised money for Biafra—\$20,000 total. He has found plenty of donors; when his group, the Biafran Famine Relief Fund (B.F.R.F.), started in June, 1968, letters to the M.I.T. staff netted some \$3,000. The balance came in small donations, largely from students at M.I.T., Brandeis, and other Boston schools.

Science Policy Studies

Academic study of science and public policy is achieving a formal organization with the development of the Science and Public Policy Studies Group, based temporarily at M.I.T. and chaired by Eugene B. Skolnikoff, Associate Professor of Political Science, who heads the M.I.T. work in the area. The Studies Group, which already has some 50 university affiliates, will serve as a clearinghouse for information, organize conferences and meetings in the field, and develop priorities in public policy issues involving science. It is an outgrowth of meetings held in connection with the American Association for the Advancement of Science by Professor Skolnikoff and others in 1967 and 1968.

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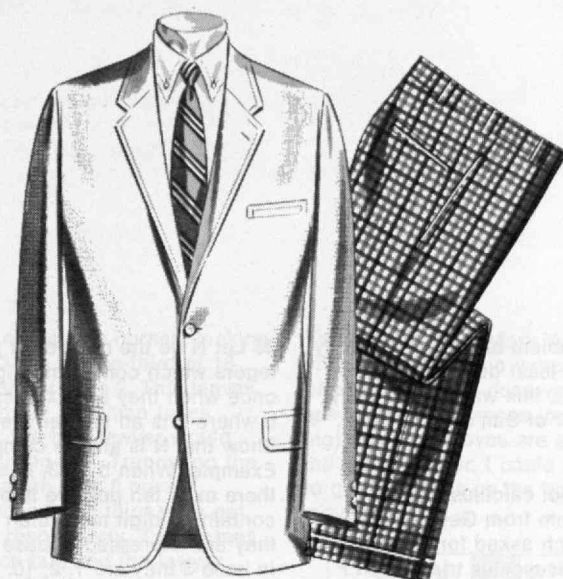


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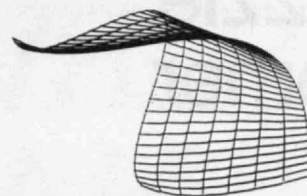
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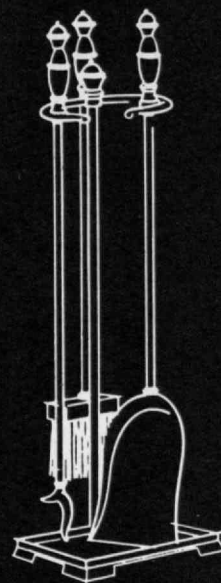
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Puzzle Corner

Allan J. Gottlieb

Hi. My backlog of puzzles is finally starting to dwindle. Hence there should not be any one-year delays between receipt of problems and their subsequent appearance in the column. In fact, if a few new ones aren't received within a few months, I will have to use some of my own. And since this invariably leads to degradation of the column, we would appreciate some fresh outside contributions. Bridge problems are in critically short supply and are particularly welcome.

Problems

The first problem this month is from John Warner Leech of Arlington, Mass.:

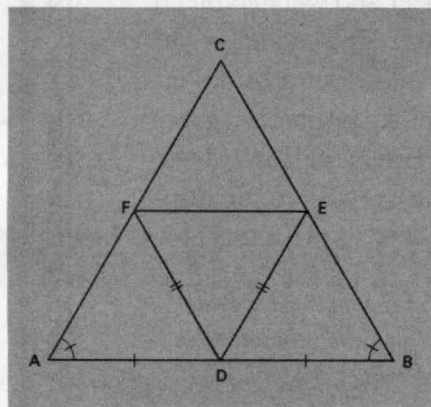
21 One commuter to M.I.T. cannot use regular gasoline in his car because the engine knocks. He does not wish to use premium gasoline exclusively because of the expense. So he uses the following scheme to eliminate the knock and reduce the expense: Each time the gas tank is half full he fills it, alternating between regular fuel (92 octane) and premium fuel (100 octane). Assuming that he has been doing this for some time, what is the octane level of the fuel in the tank after he has filled it with regular fuel? (Assume that 10 gallons of 92-octane fuel plus 10 gallons of 100-octane fuel yields fuel of 96 octane.)

Since most people find the geometry problems the easiest, I have decided to print one which appears to me to be rather formidable. Should the wording sound a little strange, bear in mind that it comes from Mr. Fine of Gloucester, England; he admits that it may be "too advanced" for the *Review*. And he also says that "though it is fairly easy to find special cases (e.g., a recurrent sequence), I have not really 'got my teeth' into this problem—which is well over 20 years old."

22 If a pair of triangles is not co-polar, the joins of corresponding vertices form a triangle and so do the intersections of corresponding sides. The original pair of triangles has been transformed into a second pair which can be transformed into a third and so on. How does the sequence of pairs of triangles behave?

The following problem arose from a study of the "bible" (at least during my freshman year at M.I.T., this was the "bible"). William J. Wagner of San Carlos, Calif., writes:

23 In a high school calculus class I assigned a problem from George B. Thomas' text which asked for the maximum area of an isosceles triangle DEF whose vertex D is the midpoint of the base of an isosceles triangle ABD. The solution requires the knowledge that FE is parallel to AB. Without giving it much thought I started to sketch a proof of this fact for the class but quickly realized I wasn't getting anywhere. Two days later I figured it out. Can you prove that FE is parallel to AB?



John E. Prussing of La Jolla, Calif., has a question about some infinite series. One clue as to how fast mathematics is changing is that, although I graduated only five years after he did, I find some of his notation unfamiliar. Hence I will accept, for partial credit, the mere definition of the function signum (x).

24 For the case $n = 10$, $x = \frac{1}{2}$, analytically evaluate the infinite series:

$$\sum_{k=1}^{\infty} [a_k k(k+1) + x^k [k - (-1)^k]/k]$$
 where

$$a_k = \frac{1}{2} [1 + \text{signum}(n - k + \epsilon)],$$

$$0 < \epsilon < 1.$$

Here is a cool number theory problem from Eric E. Hovemeyer:

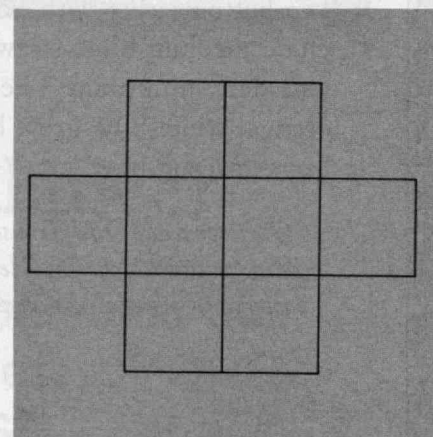
25 Let N be the number of positive integers which contain no digit more than once when they are expressed in base b where b is an integer greater than 2. Show that N is always composite.

Example: When $b = 3$, $N = 10$, since there exist ten positive integers which contain no digit more than once when they are expressed in base 3. Expressed in base 3 they are 1, 2, 10, 12, 20, 21, 102, 120, 201, 210.

Speed Department

From Marshall Greenspan of Fairfield, Conn.:

SD9 Arrange the digits 1 through 8 in the boxes of the figure below such that no two consecutive digits are adjacent either vertically, horizontally, or diagonally.



SD10 W. Cosby wants to know, "Why is there air?"

Solutions

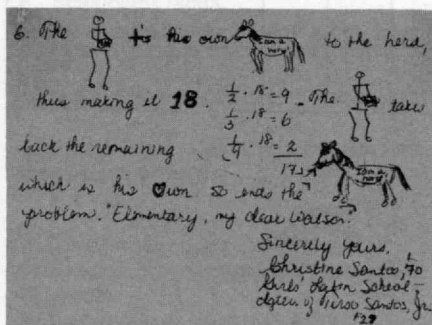
6 A man dies leaving a will stating that one-half of his horses go to the eldest son, one-third to the next oldest, and one-ninth to the youngest. Alas, at the time of death the man has 17 horses. However, a shrewd lawyer solves the problem without killing any of the horses. How?

The following is from Paul Karger, an M.I.T. undergraduate: "The honest up-standing Techman-turned-lawyer would

simply add one of his own horses, making 18. One-half of 18 is 9. One-third of 18 is 6, and one-ninth of 18 is 2. This leaves one horse which the Techman takes home. However, the true lawyer would divide 17 by 2 giving $8\frac{1}{2}$. Truncating the fraction, the first son gets 8 horses. Likewise, the second and third sons get 5 and 1 horses, respectively. Two horses go for inheritance tax, and the lawyer keeps one for his fee."

Also solved by Joseph Adolph, Richard A. Bator, Brian Bucallo, William S. Dunbar (Trinity Pauling School), Mr. Greenspan, Mary Lindenberg, Russel A. Nahigian (the proposer), Mr. Prussing, Ralph Segal, John D. Sigel (Derryfield School), Neil Steinmetz, Smith D. Turner (who signs his name j'dt), and Captain John Woolston.

For those of you who prefer the *Daily News* (New York's picture newspaper) approach, the following should be more informative:



7 Consider an infinite chessboard having one edge 8 squares long and all 32 pieces. What is the largest number of pieces which can be on the board and there still be no legal moves for either side?

Two different interpretations of this question have been submitted (notice the difference in their respective boards). The first is from Donald Oestreicher of Cambridge:

	Pawn					Pawn	
	Pawn					Pawn	
	Rook					Rook	
Knight		Pawn	Pawn	Pawn	Pawn		Knight
		Bishop	Queen	King	Bishop		
		Edge of the other side of the board					

The other is from Mark Yu, an M.I.T. undergraduate, who writes: "This sort of problem really deserves a hedgy answer, like 31 pieces (one king missing) since no moves are allowed when the game is over. I could only manage to get 26 pieces on the board (side 1 moves down):

			B ₁	R ₁	R ₁	B ₁		
		P ₁		P ₁	K ₁		P ₁	
		P ₂		P ₁			P ₂	
				P ₂			P ₂	
				P ₁			P ₁	
		P ₁		P ₂			P ₁	
		P ₂		P ₂	K ₂		P ₂	
			B ₂	R ₂	R ₂	B ₂		

"It is interesting to note that if one of the side edges is fixed, 32 pieces may still be placed on the board:

N ₁	R ₁	N ₁	B ₁					
Q ₁	R ₁	K ₁		P ₁				
B ₁	P ₁		P ₁	P ₂	P ₁			
	P ₁		P ₂		P ₂			
	P ₂		P ₁		P ₁			
B ₂	P ₂		P ₂	P ₁	P ₂			
Q ₂	R ₂	K ₂		P ₂				
N ₂	R ₂	N ₂	B ₂					

(pawns 1 move down)."

8 and 9 These problems, which appear so wildly different, actually have something in common. Nobody has solved either one!

10 A cylindrical hole of length 6 inches is drilled through the center of an ivory ball. What is the volume of the ivory remaining after the hole is drilled?

Mr. Greenspan had little trouble with this one:

"Since the radius of the cylindrical hole is not given, the remaining volume of the sphere must be independent of the cylinder radius. By setting this radius equal to zero, the diameter of the sphere becomes 6 inches and thus the volume is given by:

$$V = [4\pi(6/2)^3]/3 = 36\pi \text{ cubic inches.}$$

This result can, of course, also be shown analytically by assuming the sphere has a radius of $(3 + h)$ and thus the cylindrical hole has a radius of $[(3 + h)^2 - 3^2]^{1/2}$ or $(6h + h^2)^{1/2}$

The cutout section consists of a 6-inch long right circular cylinder whose volume is

$$V_1 = 6\pi(6h + h^2)$$

plus two spherical segments each with volume

$$V_2 = 2/3\pi h^3 + 3\pi h^2.$$

Therefore the total volume removed from the sphere is:

$$V_T = V_1 + 2V_2 = 36\pi h + 12\pi h^2 + 4/3\pi h^3.$$

The volume of the original sphere was

$$V_3 = 4/3\pi(3+h)^3 = 36\pi + 36\pi h$$

$$+ 12\pi h^2 + 4/3\pi h^3.$$

Thus, the remaining volume of the sphere is

$$V_R = V_3 - V_T = 36\pi."$$

Also solved by Norman L. Apollonio, James Barton, T. E. Dadson, Mr. Prussing, J. J. Shipman, Jack Teller, Mr. Turner, James Weigl, Mr. Yu, and Andrew Zeger.

Mr. Gottlieb, who graduated from M.I.T. in mathematics in 1967, is a teaching assistant at Brandeis University. Send answers and problems to him at the Department of Mathematics, Brandeis University, Waltham, Mass., 02154.

David L. Holt

	F	I	U	2	J	3		H	4	Y	5	P	6	I	7	T	8	L	9	K	10		M	11	C	12	H	13	F	14	D	15	B	16	W	17	G	18	
	S	19	K	20	P	21		O	22	C	23	V	24	H	25	G	26	U	27	Y	28	N	29	D	30		N	31	T	32	H	33	E	34	P	35	J	36	
M	37	S	38	X	39		E	40	R	41	J	42	W	43	S	44		S	45	Y	46	P	47	H	48	T	49	D	50	O	51	G	52		H	53	V	54	
R	55		X	56	K	57	P	58	H	59	A	60	U	61		A	62	C	63	N	64	E	65	L	66	P	67	M	68	O	69	I	70	G	71		O	72	
V	73		X	74	K	75	F	76	U	77	B	78		I	79	H	80	M	81	F	82	K	83	W	84	G	85	U	86	R	87		H	88	L	89			
H	90	C	91	N	92		J	93	M	94	H	95	S	96		P	97	D	98	F	99	M	100	G	101	X	102		A	103	E	104	U	105	Y	106	G	107	
J	108	B	109	W	110	D	111	H	112		G	113	H	114		V	115	X	116	C	117	O	118		R	119	L	120	D	121	E	122	K	123	Q	124	G	125	
F	126	T	127	U	128		N	129	U	130	K	131		H	132	X	133	I	134	Y	135	G	136	T	137	K	138	S	139	I	140	D	141	E	142		V	143	
H	144	I	145		F	146		A	147	P	148	Q	149		G	150	R	151	W	152				T	153	K	154	V	155		G	156	Q	157	C	158	W	159	
H	160	F	161		R	162	L	163	D	164	A	165		O	166	W	167	M	168	H	169			Q	170	V	171	I	172	M	173		U	174	Q	175			
M	176	E	177	K	178	P	179	H	180	V	181	T	182	G	183	B	184		R	185	F	186	D	187		L	188	A	189	G	190	S	191	B	192	W	193	N	194
R	195		E	196	C	197		E	198	Y	199	R	200	J	201	U	202	P	203	T	204	H	205			H	206	Q	207	D	208	T	209	O	210	U	211		

David L. Holt will welcome readers' comments and correct solutions to this Tech-Crostic; address him in care of *Technology Review*, Room E19-430, M.I.T., Cambridge, Mass., 02139.

To each reader who responds, the *Review* will send a reproduction, suitable for framing, of a unique full-color photograph of the Brazilian hummingbird, *Lophornis magnifica*, made by Crawford H. Greenewalt, former Chairman of E. I. du Pont de Nemours and Company, with equipment developed especially for his use by M.I.T. students in the Stroboscopic Light Laboratory of the Department of Electrical Engineering.

David L. Holt is Assistant Professor of Metallurgy at M.I.T.

A. Slayer of Holofernes.

B. Short ridges; eskers.

C. Type of pasta.

D. Existing in two or more forms.

E. Type of theater characterized by burlesque and horseplay (2 words).

F. Gas used in making synthetic rubber.

G. Countercharges.

H. Rewards for political favors (3 words).

I. Meanings.

J. Explosive used in grenades.

K. Latin church father (preceded by "St. Eusebius").

L. Plays or repeats monotonously.

M. British physicist.

N. Decrees; plays.

O. Block, part of an apparatus for measuring a ship's speed (2 words).

P. Alloy used for pen points, compass bearings, etc.

Q. Original name of Canadian capital.

R. Science of races.

S. Loch in central Scotland.

T. Friction, wearing down.

U. Pertaining to a plant which grows on the surface of rocks.

V. Time required for half of the atoms of a radioactive element to disintegrate (2 words).

W. Language of Homer (2 words).

X. Process of marking a swan.

Y. Florid style.

147 60 62 103 165 189

192 109 16 78 184

117 197 23 158 12 91 63

164 208 30 50 141 187 15 121 98

111

122 196 40 65 177 104 198 34 142

82 186 1 146 99 76 161 14 126

107 183 18 136 85 125 190 71 150

26 156 113 101 52

53 206 4 132 88 180 48 160 112

33 90 169 80 144 13 59 114

25 205 95

140 7 134 70 145 172 79

36 93 201 42 108 3

154 83 131 75 123 20 10 178 138

57

188 163 9 66 120 89

173 168 81 94 100 68 37 176 11

92 194 29 31 129 64

51 72 166 210 118 69 22

6 97 35 21 148 67 203 179 47

58

149 124 175 207 170 157

119 162 41 151 200 55 185 195 87

96 19 191 139 38 45 44

8 182 137 49 209 153 204 32 127

61 27 128 2 202 105 130 211 86

174 77

115 181 24 143 54 171 73 155

159 84 152 17 167 110 193 43

56 133 74 116 39 102

5 135 199 46 28 106

1	B	O	2	B	3	H	4	A	N	5	N	A	6	H
7	R	O	A	M	E	I								
9	Y	E	L	P	10	A	W	11	E					
12	D	E	A	D	P	A	N	T						
			T		Y	13	Y	E	A	R				
15	E	16	C	H	17	O	18	U		C				
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		22	A	V	E		24	H	E	A	P			
25	M		I		26	P	E	R	I		27	S		
28	T	R	E	M	O	R		29	R	P	M			

Technological Crossword

The correct solution to the Technological Crossword by John M. Sandor in *Technology Review* for February is shown above.

The *Review* is proud to send an M.I.T. souvenir to the following, whose correct solutions were the first received by Mr. Sandor from each Zip Code area in the U.S.:

- 0—M. G. Wittmaack, Cambridge, Mass., Francis J. Safford, Peterborough, N.H.
- 1—Milton S. Shaw, Pittsburgh, Pa., Robert Greenes, New York, N.Y.
- 3—Mrs. George A. Slifer, Jacksonville, Fla.
- 4—Mark L. Fidelman, Newburgh, N.Y., Paul McAllister, Anderson, Ind.
- 8—Douglas J. Hoylman, Tucson, Ariz.
- 9—Priscilla Newberger, Berkeley, Calif.

Strobe Probe Answer (see page 78)

Apparently some of the pellets have a specular surface and so reflect the main beam of light from the strobe lamp. This causes overexposure of the lamp image and permits an exposure of the afterglow of light that normally does not cause an exposure.

Correspondence Review

A.B.M.—Deterrent or Protection?

To the Editor:

I have a question on Jerome Wiesner's article, "Rethinking Our Scientific Objectives" (Technology Review for January, pp. 14-17).

He states that because of our efforts in developing the anti-ballistic missile system we are in a position to make an evaluation of the Soviet system—"an evaluation, incidentally, that allows us to be quite certain that the Soviet system will be almost totally ineffective against the sophisticated American missiles."

From my reading I have been "taught" that the U.S.S.R. has as good a system as we have which could inflict severe damage on the U.S.

Would Mr. Wiesner elaborate on this point?

Anatol W. Bigus
Brookline, Mass.

Dr. Wiesner replies as follows:

There is obviously some confusion in your mind between the function of nuclear-tipped ballistic missiles used as a deterrent threat and an antiballistic missile system which is designed to protect against a missile attack. In my discussion I was talking about the effectiveness of the U.S. and Soviet antiballistic systems—not about offensive systems. When I said that I did not believe the Soviet antiballistic system was very effective, I meant that in my opinion it would not be very effective in intercepting ballistic missiles launched toward the Soviet Union, and that it therefore offered the U.S.S.R. very little protection.

The fact of the matter is that the Soviet Union has not installed a complete antiballistic missile system. Some years ago they began the installation of defensive systems around Moscow and Leningrad which the experts believed were the beginnings of a major ballistic missile defense system. The actual installations were quite modest in scope and not believed adequate to defend either city.

Since then certain elements of the Leningrad system have disappeared, but

the Moscow installation has remained in place. Since the Soviet Union has always given greater weight to its defenses than to its offensive systems (a behavior pattern which is in conflict with the long-held view in the United States that the Soviet Union contemplated a first-strike attack on the U.S.), it was generally expected that the Soviets would install a massive antiballistic missile system. It is my opinion that at some stage early in the game they recognized how inadequate the system they were installing would be, and they deferred any further installation while they continued research and development in the search for a more effective system.

This is just what we did. You may recall that in 1958 and 1959 President Eisenhower was under immense pressure to approve the installation of the Nike-Zeus, and even greater pressure was applied to President Kennedy during the first two or three years of his administration. Ultimately it was generally admitted that the Nike-Zeus system was inadequate, and the more advanced systems which are now under consideration were begun. It is my opinion that the Soviet deployment was begun when it appeared almost certain that the Nike-Zeus system would be installed and probably was in part a Soviet response to American pressures. In any event, while no one really knows what the latest Soviet developments are in this field, there is general agreement that the existing installations are of little consequence.

The thing to remember about the arms race in which we are engaged is that we obtain our security from our ability to threaten massive carnage of Soviet citizens, and they likewise depend on their ability to destroy the United States for their safety. As long as this situation prevails, both nations will be forced to add to their destructive capabilities whenever any defensive system seems to be threatening to undo this "delicate balance of power."

Our efforts should be directed to stopping the arms race, not accelerating it. The deployment of an antiballistic missile system would push us in the wrong direction, and that is why I have been opposing it so vehemently. Three years ago

in a report that President Lyndon B. Johnson asked me to prepare for the International Cooperation Year, I proposed that we seek a ban on antiballistic systems and a freeze on offensive nuclear weapons. After considerable hesitation the Soviet Union has been persuaded to talk about such limitations, and the United States must now have the courage to go forward with this effort to halt the arms race, to reduce this colossal threat to our survival and to make possible more rational allocation of our resources for constructive purposes.

Rethinking Objectives

To the Editor:

In "Rethinking Our Scientific Objectives" (January, 1969, pp. 14-17) Jerome B. Wiesner presents a convincing case for allocation of federal funds to high-value programs in research and development and for creation of a planning mechanism to achieve better allocation hereafter.

One would have greater regard for these proposals, however, if they had come to grips with the question of what existing programs ought probably to be dropped or curtailed to make increased allocations possible, and under what criteria. I raise this point simply because Big Science, like Big Education, Big Defense, and other forces in our society, all tend to call for increased allocations to favored programs without conceding the need to sacrifice low-value programs.

The heart of planning is in the trade-off decisions it demands. It is, I suggest, the function of science policy spokesmen who wish public support for their priorities to be concrete and forthright as to what these might be. Otherwise, Congress and the executive branch will act as they see fit, and the trade-offs may be far from optimum, as has apparently recently been the case.

Kenneth G. Scheid
Pittsburgh, Pa.

Liberal Tamperings

To the Editor:

I suppose that it is a sign of the times for wishful politicians to regard their politics

as new and those of their opponents as old. The appearance of "Depersonalization and Frustration" in your January, 1969, issue (pp. 58-59) struck me as being out of place for a journal self-proclaiming a purpose of reviewing technology and also as implying an endorsement of the "new politics" by an apparent majority of young people and intellectuals.

Allowing for the fact that a visit and the speeches of Richard N. Goodwin, former Special Assistant to President John F. Kennedy, may be newsworthy (liberals make a lot of news but are seldom newsworthy) and also for the possibility that I, as a non-believer in the "new politics," may be in a minority among my peers (a statistical comparison may be in order), I was dismayed with both the selection of those commenting on Mr. Goodwin's remarks and their opinions.

Mr. Healy of the *Boston Globe* said little and Professor Saloma of M.I.T., a rather recent proponent of Governor Rockefeller's brand-new politics, cried about a possible strain on our two-party system until a figurehead of the "new politics" becomes installed in the White House. In short, no opposition was heard.

At root is Mr. Goodwin's thesis that technology is the cause of depersonalization and frustration among our citizens, along with "what is happening to the community, to the environment, and to the power of the people." It is usually in bad taste to criticize a quote plucked from context, but here I will make an exception.

Yes, Mr. Goodwin, things are happening in all of the areas you have cited and, I submit, are largely the result of the tamperings of a string of liberal administrations in Washington. Characteristically, such tamperings were performed under the guise of your favorite adjective—new. The New Deal, Fair Deal, New Frontier, and Great Society brought us the welfare state, demeaned individualism and innovation along the way, nurtured an amoeba-like reproducing bureaucracy, courted fiscal irresponsibility, fostered disregard for the law, and, finally, falsely promised its way into the future with policies of the "new politics" designed to eliminate the ills of the old "new politics."

The increasing frustration and alienation of the electorate is rightfully blamed on the policies and teachings of men such as Richard N. Goodwin, not, as he suggests, on the American political system.

Christopher K. Colton
Caldwell, N.J.

Concealed Change

To the Editor:
Harry A. Lipsitt's account of the three reports by the Jones, Dainton, and Swann committees (Technology Review for December, 1968, p. 12) unfortunately

misses what many of us consider to be the most interesting point in the current preoccupation with how to make the British educational system more suited to present needs.

The truth is that the rapid expansion of the higher educational system, which has doubled the number of university students in less than a decade, has brought to the surface all kinds of problems about the proper design of university curricula, the relationship between undergraduate and graduate studies, and the link between the secondary schools and the universities. All this coincides with an uncomfortable awareness in the universities of the increasing pressure from outside, particularly from the government, which at present holds the purse-strings. The result is that the next ten years are likely to see much bigger changes than there have been in the past decade. By concentrating on the problem of the supply of scientists, Mr. Lipsitt has concealed from himself and your readers the evidence of impending radical change in the system as a whole.

John Maddox
London, England

The writer is Editor of Nature magazine.
—Ed.

Dr. Lipsitt replies as follows:

In "White Paper Time" I set out to review three reports on the education, use, and movement of British scientists and engineers. The article was written by a scientist, for a scientific and technical magazine which is presumably read by a cross-section of the technically oriented. I assumed that such readers were more interested in the technical segment of the British scene than in a generalized review. This decision should not be construed as evidence of a lack of appreciation for the broader problem.

I submit to Mr. Maddox that he, not I, missed the whole point. Sadly, the fact that Britain has considered radical change, even the fact that radical change may be the only sensible course, is no guarantee that *Britain* will budge one iota.

Chemists Extinct?

To the Editor:
Professor Philip Morrison's article, "Intellectual Prospects for the Year 2000: The Natural Sciences" (Technology Review for January, pp. 18-33), was most interesting but foreboding for, according to Morrison, the intellectual prospects in the year 2000 for chemists such as me appear not to exist. In a block diagram, crisp and neat, the disciplines of mathematics, biology, physics, geology and meteorology, archaeology, and cosmology (Morrison's own field) were given the major roles. A number of topics, ranging from "transforming materials" (a subsidiary of solid state physics in the block diagram) to "basic life processes" and "study of earth as a whole," etc., were assigned as branches of the major fields.

Morrison did not avoid oblique references to chemistry, such as, "When joined with the computer and the chemical subtleties of crystal growth, physics is called solid-state physics, a very poor and partisan name for an enterprise that has developed enormously into an extraordinary science characterized by molecular and crystalline design which will one day transform all materials that men fashion. This leads directly to a new juncture where the physical chemist and the biochemist will join efforts to gain, first, a clear understanding of the mechanics of catalysis, more particularly the catalytic process of enzymes, and then to a completed molecular, structural understanding of the fundamental processes of life. This is already close at hand."

Or, later, "*—in vitro* life, that is, organisms or suborganisms made in the test tube, on the models of the organic molecules familiar in our own form of life."

And, "*—filling in the first two billion years before the Cambrian is going to be the task of a whole variety of sciences in the future—sciences based on careful electron microscopy, on powerful new geological reconnaissance methods, on laboratory simulation synthesis and analysis.*"

However, none of these endeavors of chemistry, not to mention any others, of course, are apparently sufficient to stem Morrison's verdict of extinction of the discipline. Seems a pity.

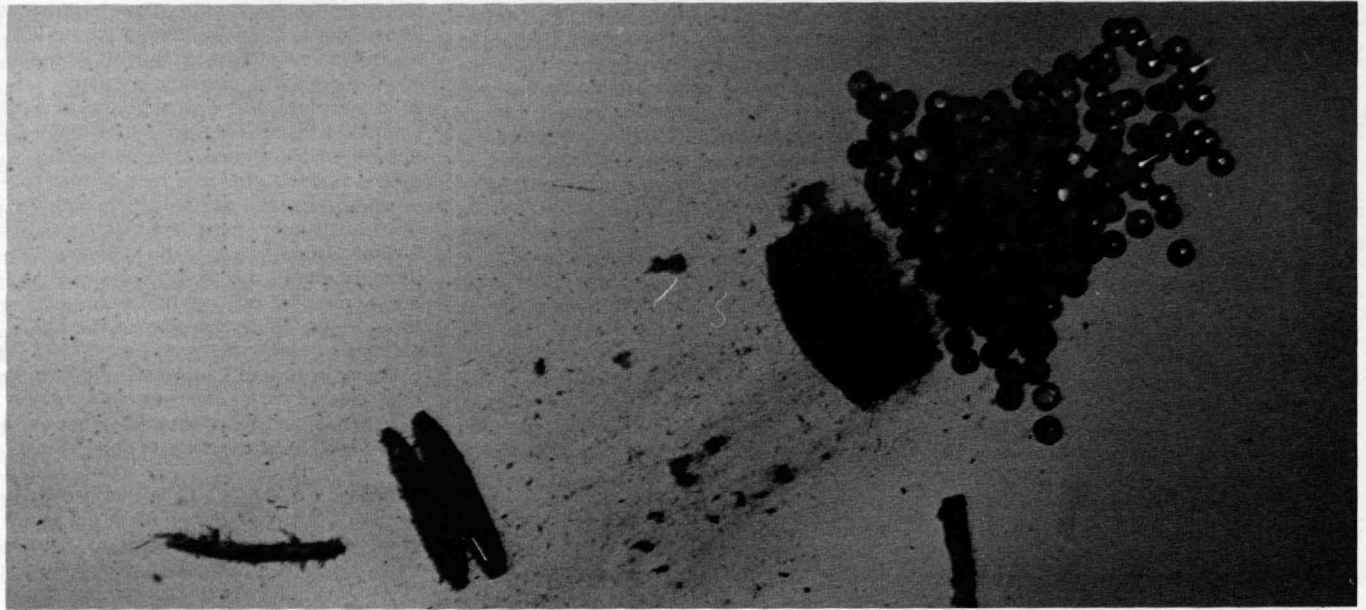
In my own parochial and simple way I like to think of chemistry as the science of atoms and molecules: their synthesis, analysis, structure, reactivity and chemical transformations. The science has, and will have, applications in many fields, but the diversity strengthens rather than obliterates the discipline. I suspect that chemistry will be very much alive and kicking in the year 2000 and I look forward to telling my friend, Philip Morrison, that (to paraquote him) "something much more surprising than what he proposes has in fact occurred!"

John Ross
Cambridge, Mass.

The writer is Head of the Department of Chemistry at M.I.T.—Ed.

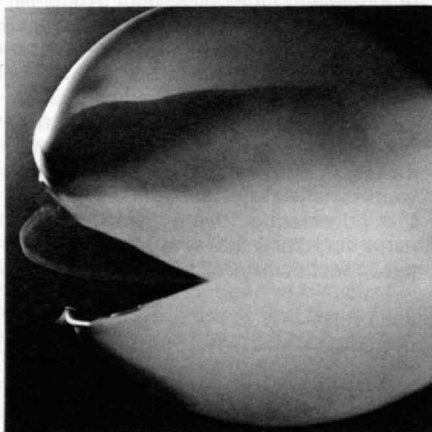
Strobe Probe

Harold E. Edgerton



The photograph shows shot gun pellets moving from left to right with the wads following. The exposure was less than one microsecond, so the motion of both pellets and wads was effectively "stopped."

Note the white streaks that start at the center of the front pellets and go along the direction of the motion. What causes these streaks? Why are they evident on only some of the pellets? (Answer on page 75.)



Theorizing On a Line

Several readers have written to suggest explanations for the line in the crack of the bursting balloon shown in Strobe Probe in *Technology Review* for January (page 61):

From Jonathan D. Wexler of Los Angeles: "Many balloons are dusted inside with powder to prevent stickiness. The line may be powder left behind by the rapid acceleration of the balloon skin in the vicinity of the crack propagation path. A static charge may help in keeping the powder in a well-defined area; rapid shear of some materials can generate a charge." (Similar suggestion also came from R. M. Crichton of Portland, Ore., Donald A. Caldwell of Mountainside, N.J., and David Lambert of San Diego, Calif.)

From Paul Arthur, Jr., of Wilmington, Del.: "Your picture suggests the possibility of triboluminescence at the rupture point of the rubber. The easiest demonstration of a similar effect is pulling strips of old-style electricians' tape off objects in a dark room. Thus your line could possibly be the locus of the break point travel—which, having writ, moves on. Thus the independent light of the tribolumines-

cence gives a photographic record of events other than at the time of the flash. To test this theory, simply burst a balloon with no flash and see if you get a line."

From John E. Marshall, Fort Worth: "I hypothesize that the line in the crack of the bursting balloon is moisture condensed from the air within the balloon as a result of the pressure drop at the instant of burst. Try one with dry nitrogen and a perfectly clean balloon." (A similar suggestion also came from Paul C. Valentine of Menlo Park, Calif.)

From Walter R. Johnson, Lanesville, Mass.: "Under the 'backlighting' conditions, the film would be exposed longer to light penetrating the initial crack, which is at the left edge of the balloon, giving rise to the thin, sharp line, brighter at the left edge. The initial circumferential crack propagation velocity is apparently much greater than that of crack widening and the latter appears to be discontinuous; having taken quite a jump from crack initiation to the instant of light quench, judging by the apparent lack of film memory to record the vertical extension in the form of a blur."

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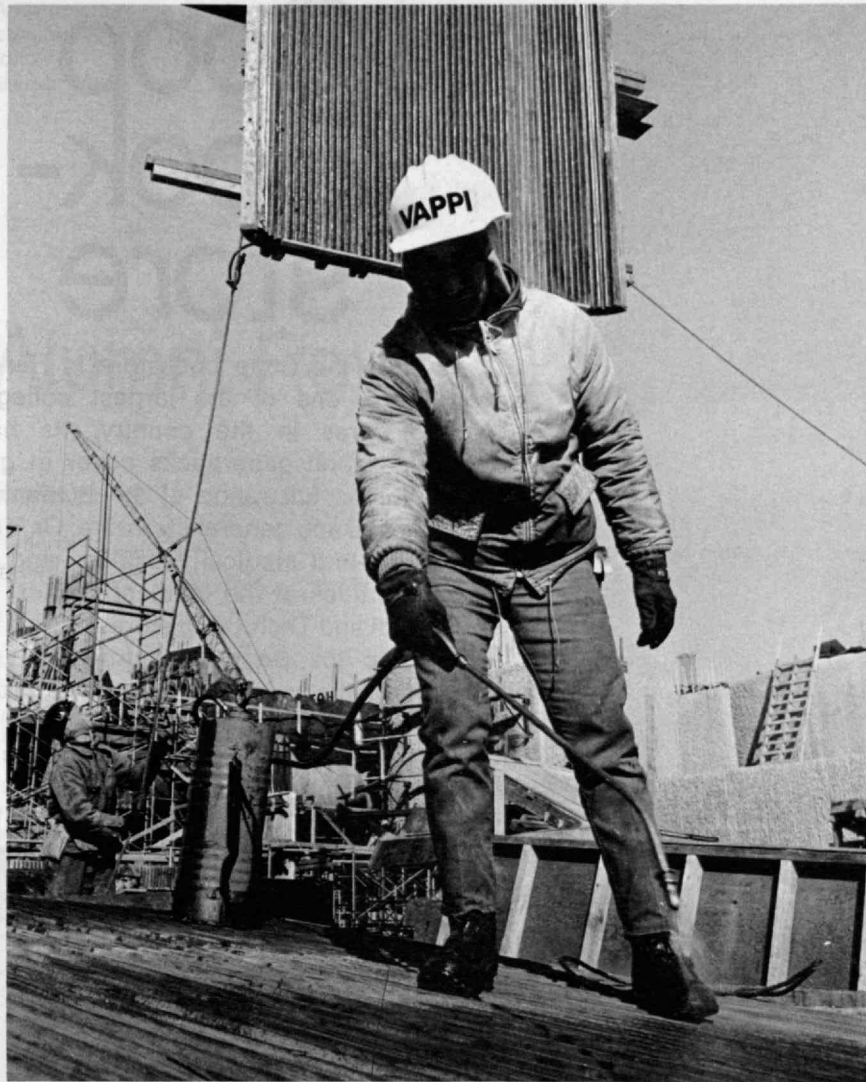
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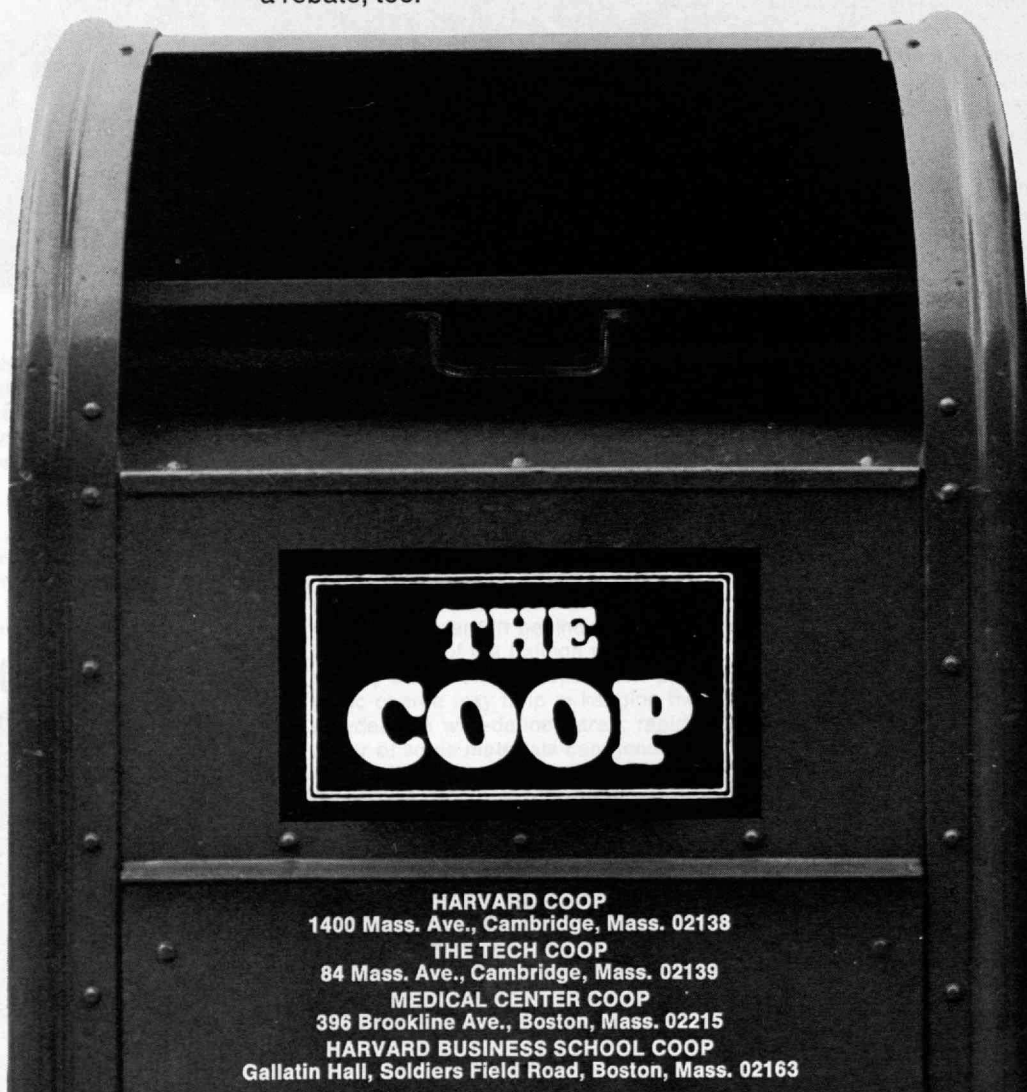
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Alumni Review

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Institute Review

Students to participate in
faculty meeting

Hummingbird courtship

New head named for Joint
Center for Urban Studies and
the Department of Political
Science

Summer Session Programs
announced

Artists and scientists—
confrontation and collaboration

Caltech student body president
offers some helpful hints

Winter sports at the half

Parents of undergraduates
organize to support M.I.T.

Alumni News

Alumni Advisory Committee
told student/Institute communi-
cations remain viable

Nominees for the 1969 election
of Alumni Association officers

Alumni events

A list of classmates deceased

Kane on M.I.T.

83 A view of classmates as noted
Henry B. Kane, '24

Class Review

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classmates

Course Review

87 Affairs of Graduate School
alumni in Courses V, VI, XIII-A,
XVI, and Sloan Fellows

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A 60-microsecond flash from three strobe lamps captures a male hummingbird (*Lophornis magnifica* from Brazil) about to land on the only perch in his plastic cage. This bird and his drab mate were the lovers in the first pictures of mating hummingbirds shown at M.I.T. this winter. (Photo: Crawford H. Greenewalt, '22)



Institute Review

Educational Decision-Making: An Historic Extension of Privilege

For the first time in M.I.T. history, students officially attended a regular meeting of the M.I.T. faculty on February 19—both as observers and, on a limited basis, as participants. The breaking of a 100-year precedent was seen by most of the M.I.T. community as a logical sequence in the increasing role of students in faculty decision-making.

Like most large groups, the faculty refers most of its problems to committees and depends heavily upon their recommendations; principal among the standing committees are those on educational policy (curricula and requirements), discipline, and environment. There are counterpart committees in the M.I.T. student government which meet regularly with faculty committees. Through these and other means for student participation in the faculty's deliberations, including student membership "by invitation" in several committees, M.I.T. students have in fact considerable "informal influence in decision-making," says President Howard W. Johnson.

To press their concern for formalizing this influence, some 20 students—many of them identified with the T.A.N.G. ("Towards a New Government") group (see *Technology Review* for January, p. 72), presented themselves at the faculty's November meeting. The Assistant Secretary distributed a statement of the "closed meeting" rule, President Johnson restated the rule—adding firmly that "I regard this as a serious matter"—and, after some tense moments, the students filed out, leaving the faculty to ponder the issues they raised.

In the ensuing two-month debate, it became clear that few students supported the concept of "participatory democracy." But many, according to Walter A. Rosenblith, Chairman of the Faculty, wanted to understand how the faculty arrives at its decisions—what kind of criteria are important and how the alternatives are evaluated.

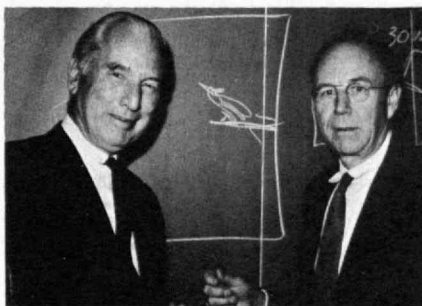
The result was a proposal by a special task force of faculty and students that for

a trial period this spring certain students who have taken a serious part in student-faculty committee discussions participate at a faculty meeting, upon invitation but without vote, when their committee's proposals are on the agenda. Other interested students (and the press), up to the capacity of a visitors' gallery, would be admitted as observers. After its January meeting, President Johnson announced that the faculty had in a close vote opted for the task force proposal. After the spring's experience, the faculty will open the question again.

President Johnson, encouraged by the decision, told the faculty that "the effectiveness of the experiment depends on whether we can work together in self-discipline and understanding. We are trying to teach those qualities at M.I.T.," he said, "and this action will help us to do so." He urged departments and laboratories at M.I.T. to continue to give students an effective voice in educational policy decisions, and he said that "this experience in consensus will be a valuable addition to learning for all of us."

A Romantic "Thank You"

Striking color photographs of a hummingbird romance, a scene never before captured on film, were shown this winter to an electrical engineering class at M.I.T. as an unusual "thank you"



Photographs such as the one opposite are made possible for Crawford H. Greenewalt, '22, by a unique portable strobe system designed and built last spring by six M.I.T. undergraduates in Harold E. Edgerton's (Sc.D.'31) electrical engineering project laboratory. When Mr. Greenewalt came to M.I.T. this fall he posed with Professor Edgerton (left), and

from Crawford H. Greenewalt, '22, former President and Chairman of E. I. du Pont de Nemours and Company, Inc. Professor Harold E. Edgerton, Sc.D.'31, and his students in the M.I.T. Stroboscopic Light Laboratory made most of the equipment used by Mr. Greenewalt to take his unique pictures; hence the special showing in Professor Edgerton's freshman seminar. "Before this gear was developed," said Mr. Greenewalt, "I had to lug around 35 pounds of equipment. Now they've cut the weight by a factor of two, a real convenience when your equipment travels by air as excess baggage," he said.

A sequence of exquisitely beautiful stills showed the pair of Brazilian hummingbirds engaged in a romantic courtship. The pictures were snapped by the birds themselves when they activated a photocell which triggered the camera. But it was not so simple after all. "I'm sure it would be impossible to photograph the male hummingbird in his natural habitat," said Mr. Greenewalt, and he described the cage in which the birds are confined during picture-taking. It contains only one perch; so when he sits, the bird must sit there, and when he does so he activates the camera. . . . a Hasselblad with Ektachrome-X film, shot at f.32 with a flash of 60 microseconds duration, 120-mm. lens and a depth of field of about three inches.



earlier the students—all members of the Class of 1970—had posed with Mr. Greenewalt's equipment (right); they are (standing): Stephen C. Poppe, Andrew I. Fillat, Richard W. Dorman, Professor Edgerton, Vernon MacRoberts (project technician); and (seated): Denis A. Bovin, George J. Varga, Jr., and Mark Khanna (lab assistant).

Wood to Head Joint Center, M.I.T. Political Science

Robert C. Wood, former Under Secretary and (briefly) Secretary of the Department of Housing and Urban Development, has returned to Cambridge in two key posts: Director of the Joint Center for Urban Studies of Harvard and M.I.T. and Head of M.I.T.'s young Political Science Department.

As Director of the Joint Center, Professor Wood, who was the first Head of the M.I.T. Political Science Department when it was established in 1965, will succeed Daniel P. Moynihan, Professor of Education and Urban Politics at the Harvard School of Education, who has been appointed Chairman of President Richard M. Nixon's new Council on Urban Affairs.

Jerome B. Wiesner, Provost of M.I.T., said in his announcement that "Professor Wood's extensive background in urban affairs and his intensive experience in Washington during a period when urban problems have become a primary national concern uniquely qualify him for his new responsibilities."

Commenting on the appointment, Martin Nolan of the *Boston Globe* noted that both Dr. Moynihan and the two previous directors of the Joint Center "have been critical of the federal government's role in cities. As a member of the President's cabinet, Wood is expected to dissent from this view." And, he said, Professor Wood is likely to "emphasize the technological aspects of urban research," since he helped to create the first government fund for technology in urban problems—a fund now budgeted at \$20 million annually.

Professor Wood came to M.I.T. in 1957, and he has been on leave since 1966 when he became the first Under Secretary of the new Department of Housing and Urban Development. He was appointed Secretary on January 2, 1969, following the resignation of Secretary Robert C. Weaver. In Professor Wood's absence, Ithiel de Sola Pool has acted as Head of the Department. "The Institute is grateful to him for the effectiveness with which he served in this role and particularly for his part in increasing the attention given by the Department to the urban field," said Dr. Wiesner.

Dreyfus Professors

George Buchi, F. Albert Cotton, and John C. Sheehan have been named Dreyfus Professors in the Department of Chemistry for the academic years 1968-70. The award is being given "in recognition of their outstanding contributions" to the field, according to the announcement by Robert A. Alberty, Dean of the School of Science. All have been members of the Department for over 12 years.

Dr. Buchi, educated at the Federal Institute of Technology in Zurich, has worked in the field of synthetic organic



Robert C. Wood



George Buchi



F. Albert Cotton



John C. Sheehan

chemistry, studying the structure and reactions of a variety of natural products. He came to M.I.T. in 1951.

Dr. Cotton's research is centered in fields of transition metal organometallic and coordination chemistry; he completed work at Harvard and came to M.I.T. in 1955.

Dr. Sheehan's research accomplishments include the first laboratory synthesis of penicillin V and the development of procedures for the preparation of synthetic penicillins. A graduate of the University of Michigan, he came to M.I.T. in 1946.

Estate Gift Associate

Arnold H. Singal, S.M.'63, has been named Staff Associate in the office of M.I.T.'s Institute Estate Secretary, where "he will provide broad support to the continuing and growing effort" to secure greater resources for M.I.T., according to D. Hugh Darden, Institute Estate Secretary.

Mr. Singal, who studied in the Sloan School of Management at M.I.T. following undergraduate work at Harvard and studies in the Yale Law School, came to his new assignment from the post of Vice President—Research, Planning and Development of Federal Distillers, Inc., Cambridge. He has been active in M.I.T. athletic affairs for the past seven years and will continue to serve as coach for the freshman basketball team.

Henry E. Rossell, 1889-1969

Commander Henry Eastin Rossell (U.S.N., Ret.), S.M.'15, Professor of Naval Construction Emeritus, died on January 7 in Deland, Fla., where he had been living since his retirement in 1946.

Born in 1889 at New Bern, N.C., Professor Rossell graduated from the U.S. Naval Academy in 1910 and after two

years with the fleet transferred to the Naval Construction Corps. He served in supervisory capacities in naval shipyards at New York and Philadelphia and became known as an authority on naval vessel construction. He was head of the Mathematics Department at the U.S. Naval Academy from 1927 to 1931, when he joined the M.I.T. faculty; he became head of Course XIII-A in 1933.

Professor Rossell retired from the U.S. Navy in 1937 but continued as professor and head of Course XIII-A at M.I.T. until 1943 when he was granted leave to become President and General Manager of the Cramp Shipbuilding Company in Philadelphia. Survivors include his wife, the former Mrs. Francis Zimmer Anderson, of Deland, Fla., two sons, Henry E. Rossell, Jr., of Kenosha, Wis., and Bernard D. Rossell of Pleasantville, N.Y., and 11 grandchildren.

Allen S. Richmond, 1906-1969

Allen S. Richmond, '28, Secretary of the Steering Committee at the M.I.T. Lincoln Laboratory, died in Concord, Mass., on January 24, 1969.

Mr. Richmond joined Lincoln Laboratory in 1955, following assignments as Assistant to the Dean of the Harvard University School of Public Health and, for five years, as Director of Public Relations for the Massachusetts Memorial Hospitals and the Boston University School of Medicine.

Earlier he had served as Executive Secretary of the Southbridge, Mass., Chamber of Commerce, Special Assistant to the President of the American Optical Company, and Administrator of the Harrington Memorial Hospital.

A "Clearable" Consultant

John Paton Davies, Jr., a career diplomat who was a member of the foreign service from 1931 to 1953, is now serving as a special consultant on an arms control study in the M.I.T. Center for International Studies.

But that simple statement hides the interest which the story has held in the national press. For Mr. Davies was dismissed by the State Department in 1953 for "lack of judgment, discretion and reliability" after he had felt the wrath of Senator Joseph McCarthy; and his service to M.I.T. comes as a consequence of having been declared once more "clearable" by the State Department.

On his M.I.T. assignment, Mr. Davies, a specialist on Latin American affairs, will review the Latin American aspects of a study of arms flow to developing countries now being completed by Lincoln P. Bloomfield, Professor of Political Science. The project is not classified, but "clearability" is required by its sponsors, the U.S. Arms Control and Disarmament Agency, for all those associated with it.

1969 Summer Programs

More than 40 topics of current technological interest will be given intensive treatment in one- and two-week Special Summer Programs during the 1969 M.I.T. Summer Session. The following courses were announced in February by James M. Austin, Sc.D.'41, Director of the Summer Session:

Aeronautics and Astronautics

Engineering Aspects of Aerospace and Undersea Medicine, Laurence R. Young, '57, August 11 to 22

Architecture

Industrialized Building, Albert G. H. Dietz, '32, August 18 to 29
Computer-Aided Urban Design, Nicholas Negroponte, '66, June 17 to 27

Chemical Engineering

Semipermeable Membranes, Edward W. Merrill, Sc.D.'47, July 14 to 23

Chemistry

Infrared Spectroscopy—Technique and Applications, Richard C. Lord, June 17 to 21 and 23 to 27

Civil Engineering

Prediction and Measurement of Stresses and Deformation in Soils, Leslie G. Bromwell, '61, August 18 to 22
Multistory Steel Building Technology, Robert J. Hansen, Sc.D.'48, June 23 to 27

Economics

Statistical Method in Modern Experimentation, Harold A. Freeman, July 7 to 18
Forecasting with Econometric Models, G. R. Sparks, June 23 to July 3

Electrical Engineering

Programming Linguistics, Arthur Evans, Jr., '54, July 14 to 25
Detection, Estimation and Modulation Theory I and II, Harry L. Van Trees, Jr., Sc.D.'61, July 7 to 11 and 14 to 18
Application of State-Variable Techniques to Communication Systems, Donald L. Snyder, Ph.D.'66, July 21 to 25
Information Technology, Myer M. Kessler, '39, August 18 to 29
Theory and Design of Optimal Linear Control Systems, Ian B. Rhodes, July 21 to 25
Display Technology, James K. Roberge, '60, August 4 to 15
Speech Communication, Kenneth N. Stevens, Sc.D.'52, June 23 to July 3

Humanities

Communicating Technical Information, Robert R. Rathbone, August 18 to 22

Management

Industrial Dynamics, Jay W. Forrester, S.M.'45, June 17 to 27
The Management of Human Resources, Mason Haire, September 8 to 12
Models for Financial Management and Long-Range Financial Planning, Gerald A. Pogue, July 21 to August 1
Frontiers in Investment Management and Analysis, Myron S. Scholes, July 7 to 18

Management Information Systems, Donald C. Carroll, Ph. D.'62, August 11 to 22

Mathematical Programming, Jeremy F. Shapiro, June 23 to July 3
Planning and Control of Operations, Wallace B. S. Crowston, S.M.'59, September 2 to 12
Management Science in Marketing, Glen L. Urban, July 14 to 25
Management of Research and Development, Edward B. Roberts, '57, July 7 to 18

Mathematics

Operations Research for Public Systems, Philip M. Morse, September 2 to 6

Mechanical Engineering

Recent Developments in Mechanical Vibrations, Jacob P. Den Hartog, July 7 to 18
Strain Gage Techniques—Lectures and Laboratory, William M. Murray, Sc.D.'37, July 7 to 11 and 14 to 18
Nondestructive Testing, William M. Murray, Sc.D.'37, June 23 to 27
Physical Measurement and Analysis, Nathan H. Cook, '50, August 18 to 29
New Developments in Modeling Analysis and Simulation of Engineering Systems, Dean C. Karnopp, '56, June 23 to July 3

Metallurgy

The Electron Microanalyzer and Its Applications, Robert E. Ogilvie, Sc.D.'56, August 4 to 15
Electronic Materials—Growth and Characterization, August F. Witt, July 14 to 25

Naval Architecture and Marine Engineering

Planning and Control of Ship Production Processes, Ernst G. Frankel, M.E.'61, August 11 to 15
Computer Applications in Naval Architec-

ture and Ocean Engineering, Justin E. Kerwin, '53, July 28 to August 8
Welding Fabrication in Shipbuilding and Ocean Engineering, Koichi Masubuchi, August 18 to 22

Nuclear Engineering

Nuclear Power Reactor Safety—Fast Breeder Reactors, Design and Materials, and Boiling and Pressurized Water Reactors, Theos J. Thompson, July 14 to 18, 21 to 25, and 28 to August 1
Thermionic Energy Conversion, Elias P. Gyftopoulos, Sc.D.'58, July 14 to 18

Nutrition and Food Science

Fermentation Technology, Daniel I. C. Wang, '59, August 4 to 8
Recent Advances in Biomedical Science for Oral Surgery, Robert S. Harris, '28, June 23 to 27

Physics

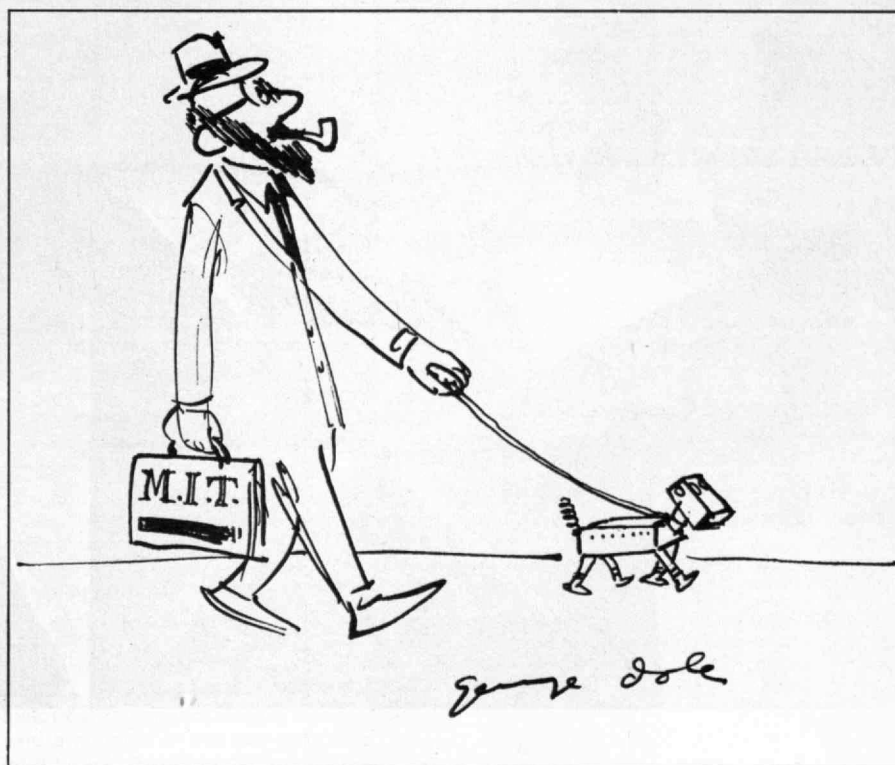
Recent Advances in Radio Astronomy, Bernard F. Burke, '50, July 7 to 18

Further information is available from the Summer Session Office, M.I.T.

Lillian Hellman on Campus

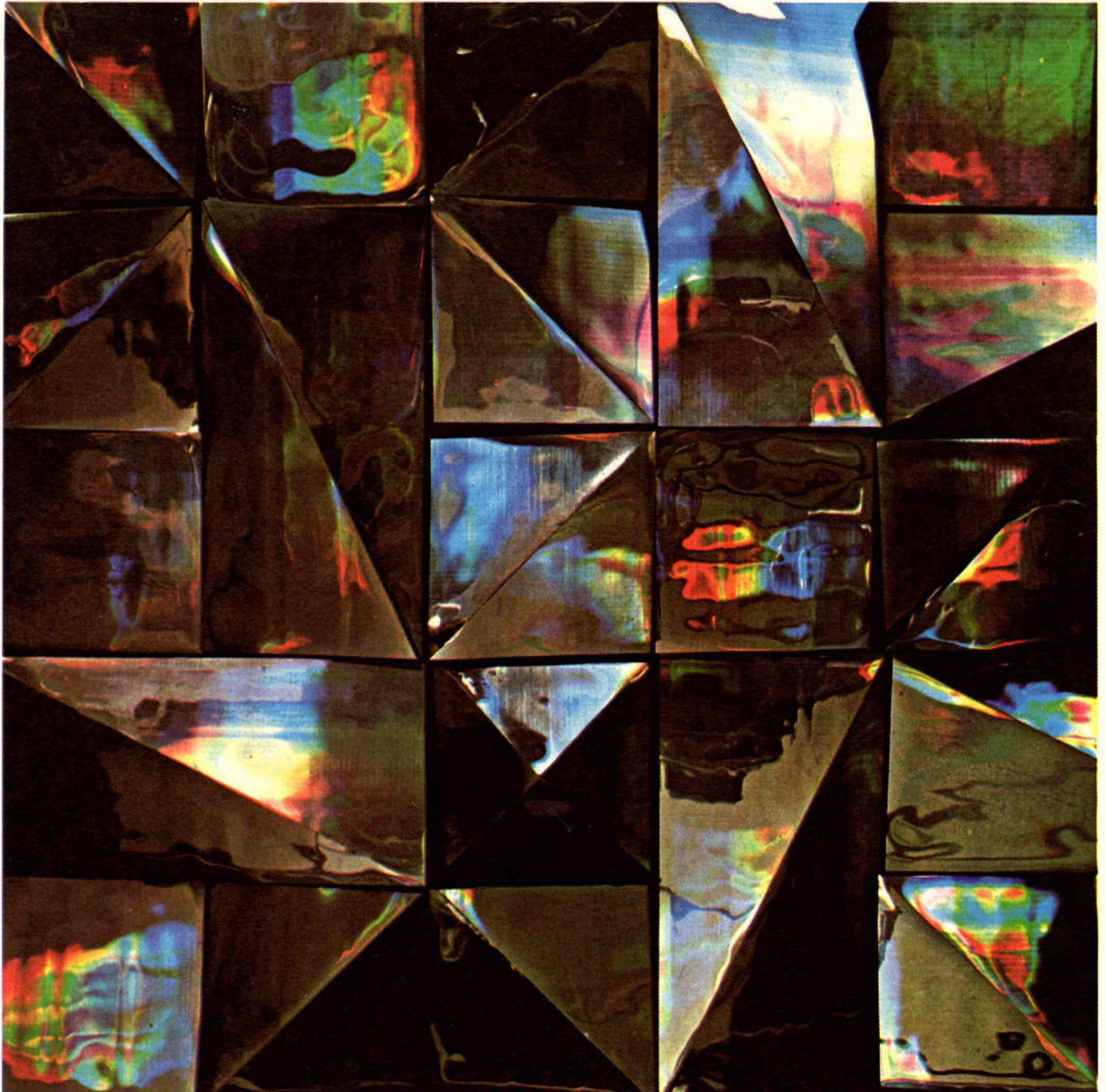
Playwright Lillian Hellman arrived on campus in early February on the invitation of the Department of Humanities to be Visiting Professor for the term. She is the noted author of "The Children's Hour," "The Little Foxes," and "Watch on the Rhine."

Miss Hellman is teaching a course in literature which combines literary analysis with original writing. The course has been limited to 10 undergraduates with writing experience. She is living on campus and has her own office in the Humanities Department.



Reprinted from *Saturday Review*, September 21, 1968

Effective collaboration between art and science has been a reality for M.I.T. undergraduates for more than 10 years—since the introduction of studio courses in the visual arts for engineering and science students. Last year, in *Humble Oil and Refining Company's Oilways* magazine, Robert O. Preusser, Associate Professor of Visual Design, described how—encouraged to use materials and concepts from their own fields of specialization—the students learn "that advancing technology can provide a continuing source of visual vitality."



(Opposite) A diffraction grating relief surfaced with aluminum coated acetate containing 13,400 grooves per inch.

(Below) A design in photosensitive copper-clad phenolic, using printed circuit techniques.

(Center) A grid of color based on light reflected from the sides of the grid.

(Right) An abstraction created by Scotch tape between two linear polarizers.

(Photos: Nishan Bichajian from Oilways)



Art and Science in Collaboration

Since today's artists look to science for fresh ideas, why don't scientists look to artists for ideas, too?

When artists and scientists confronted one another on this question across a table at M.I.T. this winter, both agreed that the scientists were more at fault. "Why don't you and I collaborate?" proposed sculptor Vassilakis Takis (see *Technology Review January, 1969, p.57*) to Oliver Selfridge of the Lincoln Laboratory during the debate. "I'd love to have you in my lab to help me . . ." came the reply. "But I want to collaborate!" retorted the sculptor.

"Takis is hurt because the scientists puts himself in a superior position to the artist in today's society," said Walter

H. G. Lewin, Associate Professor of Physics. "Nobody's going to question the role of science in our society, or challenge its profound importance," added one of the artists, Harold Tovish. "But where is art in this picture? The artist is like someone elbowing his way into the society. Even by deciding to be an artist, a man says, in effect, that he does not feel he is part of this society."

The panel, arranged by the Center for Advanced Visual Studies, included also Cyril S. Smith, Professor of the History of Science and Technology, and Jack W. Burnham, Jr., research assistant in architecture. Mr. Takis and Mr. Tovish are fellows of the Center.

Art and science can meet because their historical developments are converging, said a member of the audience who introduced himself as both a poet and a

neurophysiologist during the long question-and-answer period which followed.

"The visual arts have tended more and more towards their sensory bases; instead of paint, brushes, and canvas, the twentieth century artist uses more basic sensory modalities as his media." Meanwhile, said the poet, science has tended historically to the organic, away from the old notion that the subject of scientific study had to be inorganic matter. Now, there is even a science of behavior for all levels of organisms, the poet said. He concluded that in studying and designing a better environment, the behavioral scientists and the artists could have a true collaboration.

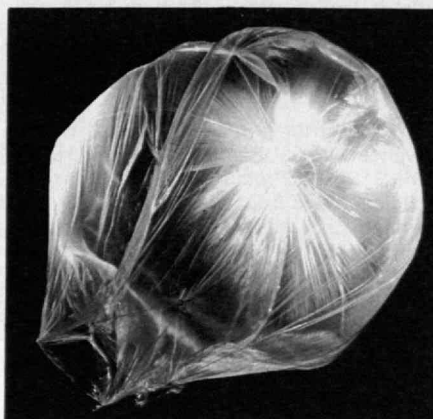
The Flying Sculpture Experiment

"They're like huge laundry bags, the jolly green giant's laundry bags," said one bystander who attended a happening titled "A Field of Hot Air Sculptures Over Fire in the Snow." The laundry bags—actually giant transparent balloons—were the creation of the German light artist Otto Piene, built under the sponsorship of the M.I.T. Center of Advanced Visual Studies and the German Center, Boston. Sheets of polyethylene in a myriad of shapes up to 50 feet long were placed over propane burners. The sculptures filled slowly with hot air and ascended into the atmosphere, held with strings and blown by the wind like kites. As the air in the balloons cooled, they descended again and were caught by crowds of children and returned to the burner for another ascent.

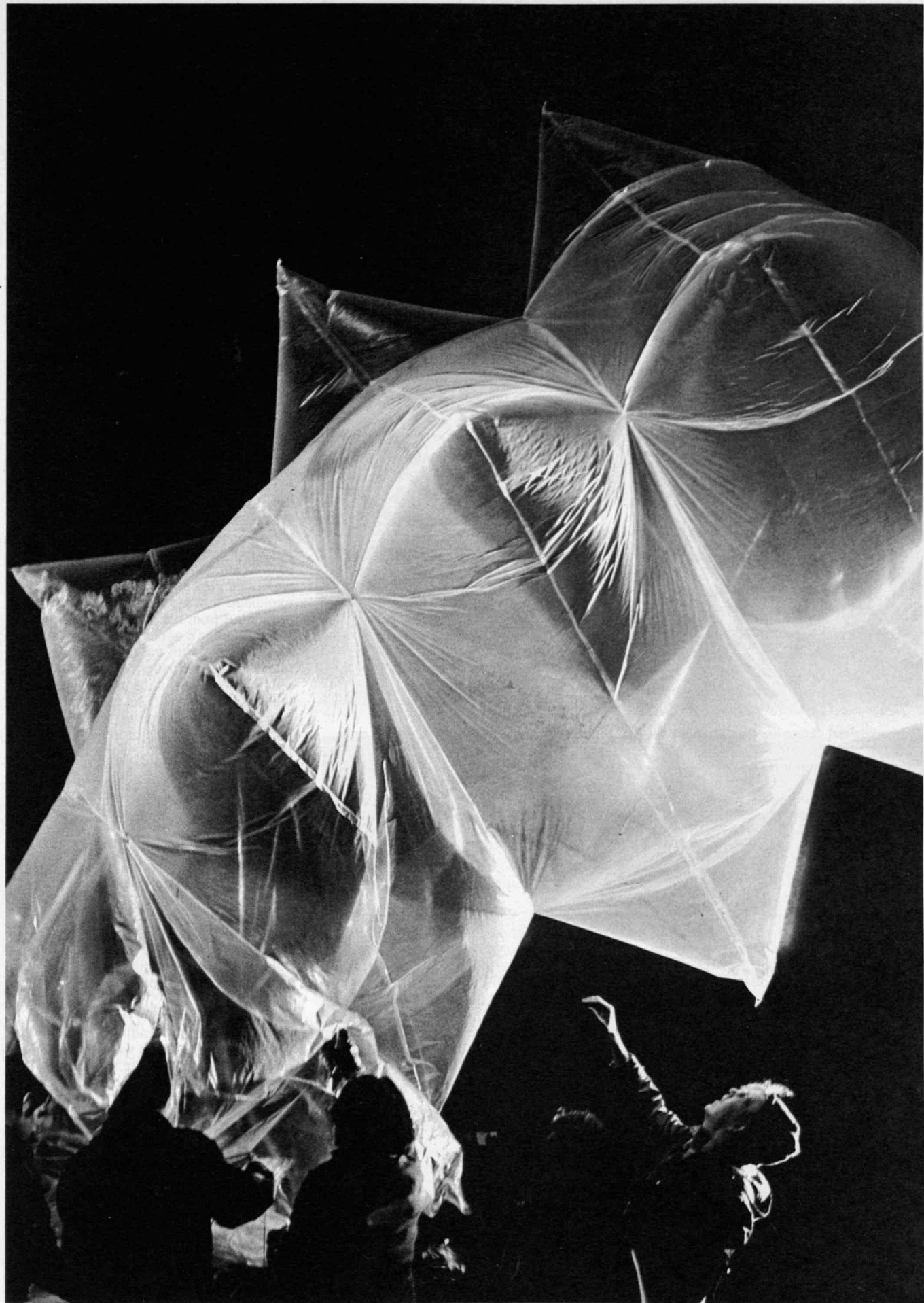
A carnival atmosphere pervaded Briggs Field; hundreds of spectators, directed by Mr. Piene and his megaphone, joined the experiment. Dozens held the sculptures as they were blown up; others took pictures or just stared in wonderment as twilight came. Everyone was fascinated, despite the absence of snow and the fact that the sculptures were much more difficult to send up than expected. The long, narrow ones never made it off the ground, but a flying pagoda was spectacular, especially after dark. The efficacy of balloon aerodynamics was proved when the small, round sculptures rose most easily.

Despite the few problems, Mr. Piene, who is a research fellow in architecture, was pleased with the happening. "This is an experiment," he said, "and what we are trying to do is find out about hot air and what it can do. This is the age of space and artists should take advantage of it."

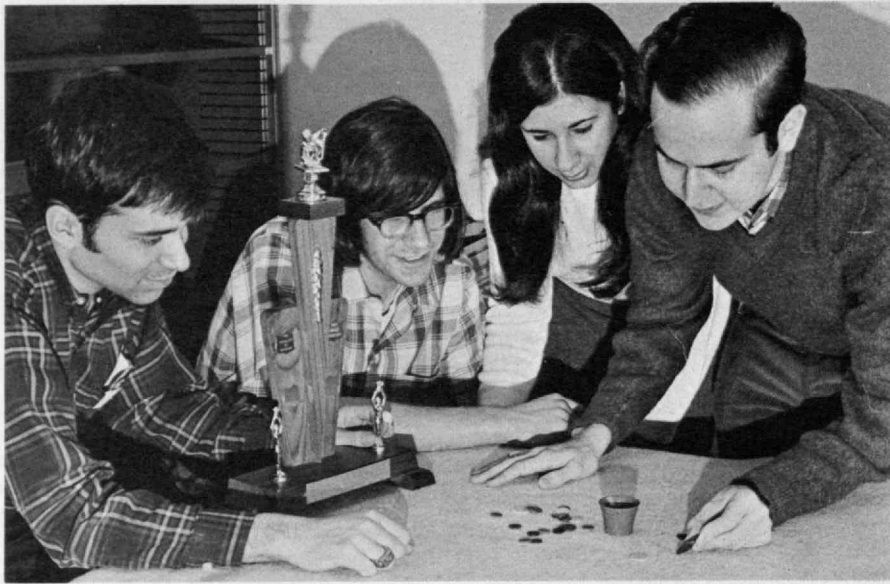
Only one balloon failed to return to earth when someone let go of the string, and it was impaled on the Briggs Field scoreboard. If in the future any mysterious U.F.O.'s are spotted over Cambridge, they will probably turn out to be more of Mr. Piene's flying experiments.



There was no snow for a "happening" called "A Field of Hot Air Sculptures Over Fire in the Snow" on Briggs Field this winter, but that failed to discourage Otto Piene (above, with the megaphone), a Fellow of the M.I.T. Center for Advanced Visual Studies, and a large band of students and friends. The result was an afternoon and evening of enchantment for some and surprises for all.



How seriously should you take tiddliwinks at M.I.T.? Just seriously enough to note the trophy—the North American championship—defended in Cambridge in February.



Squapping Across the Rubicon

To some, a green felt tablecloth brings to mind images of a gambling hall; others think of the more sedate game of bridge. But to a few select people at M.I.T., Cornell, the University of Toronto, and other schools, the green felt means tiddliwinks.

February saw the M.I.T. team host and win the North American Tiddliwinks Championship at M.I.T., and, soon, the Institute team may have the good fortune to cast its die across the Atlantic and assault the top British teams.

To we uninitiates, to squap another player's wink with your squidger to prevent his squapping you first may sound a bit unusual—not like something you would do after tea or before every meal. However, in the game of tiddliwinks all this is a common act of aggression committed by one team's player towards a member of an opposing team. And on it can depend the fate of the match.

"What Does Harvard Have That M.I.T. Doesn't? Answer: Tiddliwinks!" read the posters which originally dared students to join the team. But two years later, the successful M.I.T. team trounced Harvard royally during a three-way match with Cornell. The Harvard team dissolved

soon after, having represented the only sport in which Harvard lost to M.I.T. that year. But this triumph for M.I.T. was offset by the Institute's failure to recognize the Tiddliwinks Association as an official Institute activity until a year ago. For two years before, the team won glory for M.I.T. (and paid their own travel expenses) without being recognized at home.

The victories were motivated, apparently, out of pure intellectual curiosity. The game involves "elements of manual dexterity and large doses of strategy," explains Mitchell Wand, '69, this year's team captain. "This raises it above the level of a child's game and makes it challenging." It takes this kind of fervor to traverse Rubicons in tiddliwinks; no wonder the M.I.T. team is out to conquer!

Student Power: Tips from Sister Tech

A key cure to student apathy at a technological institute can be air pollution research, explained an unofficial guest of M.I.T. last winter. The guest was Joseph Rhodes, who for two terms has been the crusading president of the California Institute of Technology's student body. The listeners were M.I.T. student government officials and members of the student press, who have had enough

worries about the future of student government here to have been glad to listen.

Joseph Rhodes does not see the role of a student president as any in-house, campus-sized job. He explained why he traveled so often. "I've been working increasingly on programs beyond Caltech. For example, now I consult with the School of Education at the University of Massachusetts, and I'm a consultant to the secretary of H.E.W., and I was just appointed to an Office of Education panel, which, I think, will study the problem of diversifying school system personnel."

Mr. Rhodes also explained to his M.I.T. listeners why it was important for student government to become involved with a research project. "We didn't start the air pollution project because, as many people think, we were concerned about air pollution. Our main concern was how this might have an impact on Caltech as an educational institution.

"So we asked ourselves what kind of thing we could put together to deal with these problems. We felt it should come to grips with problems in the community. We felt we had to have something where people could release their intellectual energies and also satisfy some of their social concerns. That was why we chose air pollution." Mr. Rhodes also explained that the research program originated from his desire for change at Caltech, after a series of open meetings and meetings with the faculty. "We found that even though we could do very public things, real substantive change in the Institute was very hard to see. We wanted change, no matter what we called it. So we decided to call it a research project, and invite girls to work on it, and that would stir things up a little, and so on." Eventually, he said, more than 200 students, faculty, and outside people were involved.

The secret of his success? "We developed power within the Institute because we understood how it functioned," Mr. Rhodes explained. For example, the student government won some of its requests by adhering to a strict no-confrontation policy. "We found that when confrontations were building up, we were able to work things out."

One student asked Mr. Rhodes if he felt the strong and "radical" student government at Caltech was responsible for the fact that Students for a Democratic Society (S.D.S.) and other left-wing groups were weak at Caltech. Perhaps, Mr. Rhodes said. "Our student government is the most radical institution on campus . . . I don't think that Caltech as a result is getting to be a more flexible or sensitive institution, but I think the student body has become a lot more sophisticated in their approach to their problems, and that has made the difference."



A photographic kaleidoscope of winter sports: James P. Glowienka, '71, clears the bar at 10'6" against Columbia; Dick Hood, '70, in the New England gymnastics; Bob Listfield, '70, leads the M.I.T. basketball team against Middlebury; the start of the 200-yard free-style against Wesleyan (M.I.T.'s Luis A. Clare, '69, is in the center position); and M.I.T.'s greatest wrestler, Frederic W. Andree, '70, victorious over his Harvard opponent. (Photos: Craig R. Davis, '71, Richard M. Koolish, '68, and Gary A. De Bardi, '71, from *The Tech and Technique*)

Winter Sports at the Half

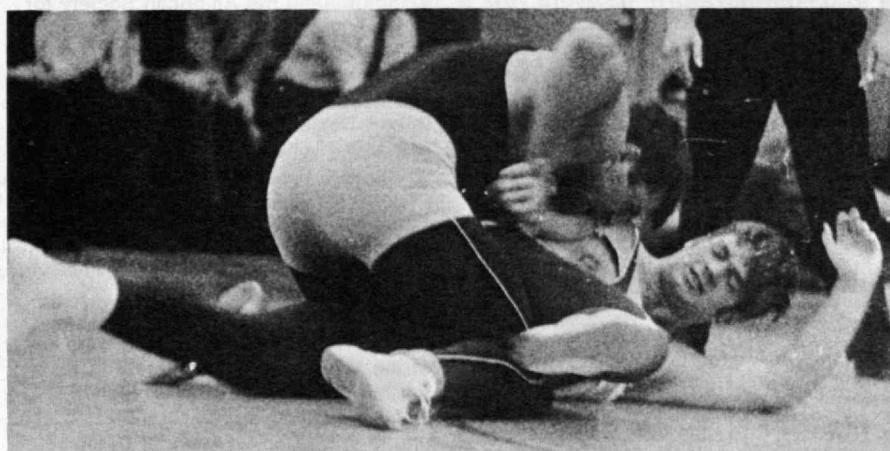
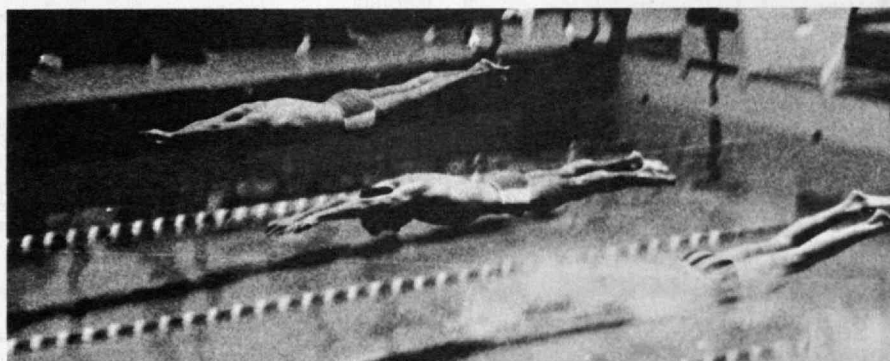
As the winter sports season reached the half-way mark, most of the headlines belonged to the runners and the wrestlers.

Frederic W. Andree, '70, remains undefeated; he is already recognized as the greatest wrestler in M.I.T. history with a 31-match winning streak still going, and the experts are now guessing that it may not stop for another season and a half. The highlight of the winter to date was his victory over his Harvard heavyweight opponent, part of the wrestling team's first win over Harvard in eight years.

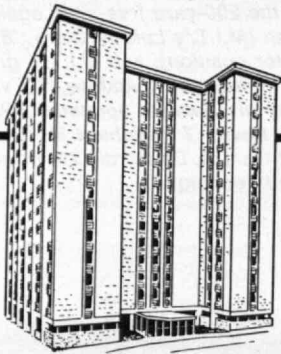
Ben T. Wilson, '70, is off to his finest season of indoor track, with the Knights of Columbus, B.A.A., and Greater Boston Collegiate meets on his schedule. His 9:00 two-mile time in the first of these was good for a fifth place, and the word was out that he will do better next time. Two thirds in the Knights of Columbus event went to William N. McLeod, '69 (broad jump—22' 1 1/4"), and Kirk D. Wings, '71 (high jump—6' 3").

The Wilson name (Benjamin W. Wilson, '72, no relation to Ben Wilson above) is still a factor in M.I.T. basketball, this time as freshman co-captain. He leads the freshman team with a scoring average of 14.5, and he stands 6'6"; but the most important statistic is that this Wilson is a brother of Alex Wilson, '67, who holds the all-time single-season and career basketball scoring records at M.I.T., a son of Richmond Wilson, '40, and a grandson of Duncan Wilson, '17.

Another winter sports headliner is Geoffrey G. Hallock, '69, who in a single weekend of squash beat opponents from Williams, Adelphi, and Trinity.



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Anthony D. Kurtz, 1951

Ronald A. Kurtz, 1954

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The First Parents' Fund

Donald L. Arenson, Vice President of Booz Allen and Hamilton, Inc., of Chicago, has been named Chairman of the 1969 Parents' Fund, M.I.T.'s first effort to establish a means for the parents of Institute undergraduates to support M.I.T. Mr. Arenson's son, Gregory, is a member of the Class of 1970 majoring in economics.

T. Guy Spencer, Jr., '56, Associate Director of the Alumni Fund, will work with Mr. Arenson to establish a committee in support of the new program and to begin solicitation among the parents of M.I.T. undergraduates.

Briefly Noted . . .

Woods Hole Grant: International Business Machines Corporation has given the Woods Hole Oceanographic Institution a \$150,000 educational grant in support of Woods Hole's participation in the joint (with M.I.T.) graduate oceanography program which leads to Ph.D. degrees.

Individuals Noteworthy

To *Manson Benedict*, Ph.D.'35, Head of the M.I.T. Department of Nuclear Engineering, the U.S. Atomic Energy Commission citation "for his continuing service to research and education in the field of nuclear engineering."

To *Isadore M. Singer*, Professor of Mathematics at M.I.T., the Bocher Memorial Prize of the American Mathematical Society for work done jointly with Michael Ariyah of the Oxford University Mathematics Institute on the so-called "index theorem."

To *Melvin C. Teich*, '57, Assistant Professor of Electrical Engineering at Columbia University, the 1969 Browder J. Thompson Memorial Prize of the Institute of Electrical and Electronics Engineers for the best paper appearing in an I.E.E.E. publication by an author under 30 years of age.

To *Robert C. Wood*, Head of the M.I.T. Political Science Department (then the Under Secretary of Housing and Urban Development), the Norbert Wiener Medal for Cybernetics of the National Bureau of Standards and the American Society for Cybernetics.

To *William A. Zisman*, '27, of the Naval Research Laboratory the Navy's Captain Robert Dexter Conrad Award "for notable research in chemistry during the past 29 years."

To *Horace W. McCurdy*, '33, membership in the Helms Rowing Hall of Fame at the 1969 Rowing Awards Dinner in New York on January 24.

To *Dr. William Haddon, Jr.*, '49, Director of the National Highway Safety Bureau, the Modern Medicine Distinguished Achievement Award for "trailblazing scientific research in causes of traffic

trauma and administrative efforts to promote highway safety."

To *B. Paul Blasingame*, Sc.D.'50, General Manager of AC Electronics Division of General Motors, the National Aeronautics and Space Administration's public award "in recognition of significant contributions to the space program."

Colonel *Edwin E. Aldrin, Jr.*, Sc.D.'63, will be pilot of the lunar module on Apollo 11, and if all goes according to plan he will be one of the two first Americans to set foot on the moon. Colonel Aldrin first flew as co-pilot of Gemini 12 (see *Technology Review* for February, 1967, pp. 19 ff.); his father is *Edwin E. Aldrin*, '17.

To *Roger Arndt*, Ph.D.'67, Assistant Professor of Aerospace Engineering at Pennsylvania State University, the Lorenz G. Straub Award of the St. Anthony Falls Hydraulic Laboratory (University of Minnesota) "for a meritorious thesis in hydraulic engineering."

Paul V. Cusick, Comptroller of M.I.T., to the American Council on Education *ad hoc* Committee on Indirect Costs. . . . *William L. Taggart*, '27, to Executive Vice President of Industrial Chemicals Group, Dewey and Almy Division of W. R. Grace. . . . *Henry N. Bates*, '30, to Vice President—Administrative Services of Johns-Manville Corporation. . . . *Joseph J. Dysart*, '33, to Vice President for Product Support (DC-8 and DC-9 program management), Douglas Aircraft Company.

J. Robert Ferguson, Jr., '37, to Vice President—Engineering Services of U.S.S. Engineers and Consultants, Inc., a new subsidiary of United States Steel Corporation. . . . *Benjamin W. Badenoch*, '39, to Vice President of Sperry Rand Corporation. . . . *Joseph G. Gavin, Jr.*, '41, to Director of Space Programs, Grumman Engineering Corporation.

Alvin G. Waggoner, '42, to Vice President of Airborne Instruments Laboratory Division of Cutler-Hammer. . . . *Edward R. Kane*, Ph.D.'43, to Vice President, Director, and member of the Executive Committee of E. I. du Pont de Nemours and Company, Inc. . . . *Louis H. Roddis, Jr.*, S.M.'44, to Vice Chairman and Director of Consolidated Edison Company, New York.

William C. Schneider, '49, to Director of the Apollo Applications Program, N.A.S.A. . . . *Thomas F. Jones, Jr.*, Sc.D.'52, President of the University of South Carolina, to a long-range planning committee for the National Science Foundation. . . . *Norman E. Cooke*, Sc.D.'56, and *Thomas B. Doherty*, S.M.'38, to President and Vice President respectively of the Canadian Society for Chemical Engineering.

Alain C. Enthoven, Ph.D.'56, formerly Assistant Secretary of Defense for Systems Analysis, to Vice President—Economic Planning of Litton Industries, Inc.

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Alumni News



The January meeting of the Alumni Advisory Council was one of the largest in its brief history, as members were drawn by the promise of Kenneth R. Wadleigh's ('43) report on recent student activities at M.I.T. As he opened his remarks, Professor Wadleigh, who is Dean of Student Affairs, displayed for members (left, above) the sheaf of his notes on the events and the forces behind them in the fall of 1969. Later there were also comments by Stephen C. Ehrmann, '71 (left).

Alumni Advisory Council: A Dean's Statement of Principle

Though hard-pressed by students' increasing concern to affect institutional as well as national policy, M.I.T.'s traditional channels of community responsibility and communication remain viable. And it is the Institute's central policy to keep them so, Kenneth R. Wadleigh, '43, Dean of Student Affairs, told the Alumni Advisory Council late in January.

M.I.T. has "a long history of student-faculty-administration relations which are open and frank," Dean Wadleigh said, and he outlined two principles which guide the Institute's officers in maintaining them: M.I.T. must provide an environment which maintains opportunities for reasonable dissent, while preserving the reasonable rights of others; and "avenues of debate and vehicles to effect change must remain accessible to all members of the community."

Reviewing recent events at the Institute, Dean Wadleigh emphasized his belief that these principles—though strained—have been fulfilled. He discussed in detail the community's response to students using Dow Chemical Company interviews in November, 1967 (see *Technology Review for December, 1967*, pp. 54-55), and then the "sanctuary" (see *Technology Review for December, 1968*, p. 107) as ways of protesting the Vietnam war and Selective Service policies, and—more recently—M.I.T.'s efforts to respond to students' increasing concern for admissions policies (see *Technology Review for February, 1969*, pp. 78-80) and academic planning (see page 63).

Indeed, said Dean Wadleigh, quoting his own annual report for the 1967-68 academic year, this trend of greater student participation is healthy for two reasons: students "often bring a perspective and quality of imagination" which older members of the community do not have; and through their participation students learn "at first hand how decisions are made in the complex structure typical of most good academic institutions." This learned, he said, they "achieve a quick understanding of and tolerance for the complexities involved," and they "become extremely effective contributors."

It's important to note as well, said Dean Wadleigh, that student concern for social and political problems has taken many positive forms. He cited the many community service activities undertaken by students and staff—tutoring, high school teaching, Saturday high school classes, and Upward Bound activities (see "*I Have Seen It Happen*," by Richard P. Adelstein, '68, in *Technology Review for July, 1968*, pp. 61-63).

What of the future?

Little has happened in the last 12 months, said Dean Wadleigh, to ease "the mounting tensions and frustrations felt not only by students but by thinking

people everywhere." Clearly, he said, protest against national policies involving Vietnam and Selective Service will continue this spring, though he did not propose to forecast the forms it may take.

Of greater concern, because it more directly tests the community's ability to maintain open channels of communication, will be the pressure from students for understanding of and involvement in the academic decision-making process—for increasing flexibility in the curriculum, on M.I.T.'s commitment to R.O.T.C. and on its use of federal funds—particularly defense funds—for education and research.

Alumni Fund Mid-Year Report: Heading Toward a Record Year

New records in both number of participants and the amount of their gifts were posted by the M.I.T. Alumni Fund at the mid-point of its 1968-69 year, and the Special Gifts Campaign, which ended early in January before the start of the Fund's regional campaign, reported a total of 107 per cent of its goals which were themselves higher than the 1967-68 goals.

As of February 5, the Fund stood at \$1,657,336—up 27 per cent from the 1968 Fund at the same date. Contributors totalled 11,255, a 10 per cent increase. Howard W. Johnson, President of M.I.T., called the results "a remarkable demonstration of support and loyalty."

The Special Gifts Campaign, organized in 27 cities throughout the country, posted a total of \$497,328, compared with a goal of \$426,750 and a 1967-68 performance of \$466,935. Leading the Special Gifts effort were the Houston-Beaumont region, Texas, 259 per cent above its goal (Herbert R. Moody, '41, Chairman); Philadelphia, 268 per cent (Robert E. Worden, '36); and San Francisco, 281 per cent (William C. Mentzer, Jr., '31). Other high performances came from Dallas-Fort Worth (Jack C. Page, '48), 118 per cent; Erie, Pennsylvania (George S. De Arment, '37), 126 per cent; Los Angeles (Frank S. Wyle, '41), 131 per cent; New York (Dayton H. Clewell, '33), 134 per cent, and Syracuse (Robert P. Frenzel, '48), 100 per cent. The figures, said Robert Hagopian, '47, Associate Director of the Fund, speak clearly for the "major impact" of Special Gifts on the Alumni Fund totals.

Alumni Association: The 1969 Annual Election

New Officers of the M.I.T. Alumni Association and Alumni Term Members of the M.I.T. Corporation will be chosen by a national ballot of nearly 50,000 members of the Association before April 15, 1969. Philip H. Peters, '37, nominated for President of the Association for 1969-70, leads a slate of 12 names for major positions, and alumni will also choose three members of the National Nominating Committee who will select nominees for 1970-71.

Officers and Directors

Mr. Peters, the presidential nominee, is Senior Vice President of the John Hancock Mutual Life Insurance Company and has a distinguished record of service to his community and to M.I.T. He has been a member of the Alumni Council since 1938, has been Reunion Chairman for each of his class' gatherings since graduation, was chairman of the Area Organization activities for the M.I.T. Second Century Fund and Chairman of the Alumni Fund Board in 1966-67, and has been associated with Alumni Day Committees, the Educational Council, the Advisory Council on Undergraduate Government, and the Corporation Development Committee. Mr. Peters is a Director of the Greater Boston Chamber of Commerce and of the Boston Rotary Club.

Two nominees for Vice President (two vacancies) of the Alumni Association have been chosen by the 1968-69 Nominating Committee: Harold W. Fisher, '27, Vice President and Director of Standard Oil Company (New Jersey), and Russell L. Haden, Jr., '40, President of Ionics, Inc., of Watertown, Mass. Mr. Fisher was General Chairman of the M.I.T. Alumni Center of New York in 1967-68, following earlier service as Vice Chairman (1965-66) and Deputy Chairman (1966-67). He is a member of the M.I.T. Club Advisory Board and of the Visiting Committee to the Center for International Studies, and he was Chairman of his class' 40th Reunion Gift Committee. Mr. Haden, active in Alumni Fund regional and special gifts efforts and in class reunion planning, has been a member of the Executive Committee of the Alumni Association (1967-68) and was Chairman the 1968 Alumni Day.

Nominees are presented for six members-at-large of the Alumni Association's Board of Directors—John W. Barriger, 4th, '49, Manager of Transportation Control Systems of Sylvania's Commercial Electronics Division (Bedford, Mass.); Thomas F. Malone, Sc.D. '46, Senior Vice President and Director of Research for the Travellers Insurance Company; Stanley M. Proctor, '43, President and Treasurer of Stanley M. Proctor Company (Cleveland); Ellis C. Littmann, '33, President and Treasurer of Nixdorff-Krein Manufacturing Company (St. Louis); Paul P. Shepherd, '53, Vice President of Cabot, Cabot and Forbes (San Francisco); and William C. Howlett, '49, President of Union Iron Works Company (Herndon, Va.). All have been active in club and fund activities of the Alumni Association, and Mr. Proctor holds the Association's Bronze Beaver Award (1968).

Corporation Members

Three nominees are presented for Term Membership on the M.I.T. Corporation: Carl M. Mueller, '41, Partner and Member of the Management Committee of the New York investment house of Loeb, Rhoades and Company; Breene M. Kerr, '51, Director of Kerr-McGee Corporation (Oklahoma City); and Harold E. Thayer,



J. W. Barriger, '49



H. W. Fisher, '27



R. L. Haden, Jr., '40



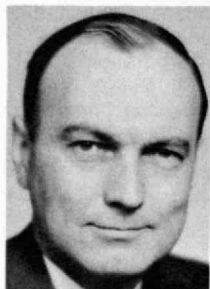
W. C. Howlett, '49



B. M. Kerr, '51



E. C. Littmann, '33



T. F. Malone, '46



C. M. Mueller, '41



P. H. Peters, '37



S. M. Proctor, '43



P. P. Shepherd, '53



H. E. Thayer, '34

President and Chairman of the Mallinckrodt Chemical Works (St. Louis).

An M.I.T. graduate in chemical engineering and management, Mr. Thayer has been associated with the Mallinckrodt Chemical Works since 1939. He has been active in M.I.T. affairs in the mid-west, and he is prominent in St. Louis civic activities, including the United Fund, the St. Louis Area Council of the Boy Scouts of America, and the Metropolitan St. Louis Chamber of Commerce. Mr. Thayer is a Trustee of Washington University and holds an honorary degree from the St. Louis College of Pharmacy.

Mr. Mueller has served for six years on the Alumni Fund Board, for 15 years as an Educational Counselor, for four years as a member of the Visiting Committee to the Department of Economics, and for four years as a member of the Corporation Development Committee. He is an Allied Member of the New York Stock Exchange and a Member of the National Stock Exchange, the New York Coffee and Sugar Exchange, Inc., and the New York Mercantile Exchange.

Mr. Kerr is completing his first year as Vice President of the M.I.T. Alumni Association; he is a member of the Alumni Club Advisory Board, the Corporation Development Committee, the Corporation Visiting Committee on the Earth Sciences, the Alumni Fund Board, the Educational Council, and he is Vice Chairman of the Alumni Association's Committee on Revision of the Constitution and Bylaws. Formerly in the top administration of the N.A.S.A. program, and of Kerr-McGee Chemical Corporation, he is now Senior Partner of the Research Analysis and Management Group, Inc. (Oklahoma City).

Nominating Committee

Candidates for the 1969-70 Nominating Committee of the Association include: From District 5—the Middle East Coast:

Michael V. Herasimchuk, '39, of Bethlehem Steel Corporation; William H. Bertollet, 3d, '48, Vice President of Laurel Products Corporation (Philadelphia); Arnold A. Archibald, '28, Administrative Vice President of Jones and Laughlin Steel Corporation; William L. Dennen, '17, of Dalton Pa.; and Charles A. Speas, '42, Vice President-Research and Development of Hedwin Corporation (Baltimore). From District 6—the East Central U.S.: Joseph E. Dietzgen, '41, President of Eugene Dietzgen Company (Chicago); Rutherford Harris, Vice President of the Arkwright-Boston Manufacturers Mutual Insurance Company (Cleveland); and David R. Goodman, '40, President of Madison Chemical Company (Madison, Ind.). From District 8—the Southeastern U.S.: C. Haskell Small, '30, Colonel, U.S. Army (Retired); Joseph C. Jeffers, Jr., '40, President of Jeffers and Moore, Inc. (Charleston, W. Va.) and Hugh W. Schwarz, '42, Vice President and Director of Corporate Planning, the Coca-Cola Company (Atlanta).

New York: A Seminar On Management for the Seventies

One of the most ambitious programs ever undertaken by the M.I.T. Alumni Center of New York will take place on April 21 and 22 at Arden House in Harriman, New York, in the form of a two-day seminar on "Strengthening Management for the Seventies."

Senior executives of industry and lively representatives of the academic community will lead the discussion. Among them: Anthony Wiener, Hudson Institute, co-author with Herman Kahn of *The Year 2000*; Dayton H. Clewell, '33, Senior Vice President of Mobil Oil Corporation; John W. Kunstader, '49, Director of Research and Development at Genesco, Inc. Frank R. Millikan, '34, President of Kennecott Copper Corporation, will act as Sponsoring Chairman for the event.

E. Marshall Nuckols, Jr., Senior Vice President of Campbell Soup Company, will talk about his company's experiences in dealing actively with the problems of Negro citizens. Richard Flacks of the Department of Sociology at the University of Chicago will discuss alienation and radicalism in the 1970's. Multinational businesses will be dealt with by W. Michael Blumenthal, President of Bendix International, while marketing in the 1970's will be discussed by Professor Arnold E. Amstutz, '58, Professor of Marketing at M.I.T.'s Sloan School of Management. Looking ahead to new solutions to management problems, Donald Carroll and Mason Haire, both members of the Sloan School faculty, will discuss, respectively, information systems for management and developing tomorrow's managers through organizational psychology.

"The 1970's must make new demands on managers," says the Committee's announcement. "Despite computerized management information systems and decision aids, there will be more need than ever for managers to understand their function and function with understanding."

All alumni are invited to attend these two days of seminar discussion. The price, including room and meals, is \$110 (\$90 to members of the N. Y. Alumni Center). Checks reserving places and requests for more information should be sent to the Chairman of the Educational Seminar Committee, Dr. Albert B. Van Rennes, '55, Technical Director, Bendix International, 111 West 50th Street, New York, N.Y., 10020. Space is limited, so please act promptly.

Alumni Calendar: Two Conferences and a Fiesta

Three major events are on the calendars of M.I.T. alumni in March and April—the 21st annual M.I.T. fiesta in Mexico City on March 13, 14 and 15, the M.I.T.

Eastern Conference in Garden City, N.Y., on March 15, and the M.I.T. Midwest Conference in St. Louis on April 12.

Over 100 American alumni and their wives are expected in Mexico City on March 13 for the opening of the three-day traditional fiesta; the schedule includes an extensive social calendar, an address by Howard W. Johnson, President of M.I.T., a *noche Mexicana* at the 16th-Century convent home of Mr. and Mrs. Frederico Tamm, and tours to nearby sights.

Long Island Conference

The Garden City Hotel in Garden City will be the scene of a major conference for M.I.T. alumni, guests, wives, and selected high school students from the Long Island area on Saturday, March 15. The all-day program will be devoted to "Technology and Society—Challenge and Conflict;" speakers will include Robert A. Alberty, Dean of the School of Science; Secor D. Browne, Associate Professor of Flight Transportation; Patrick M. Hurley, Professor of Geology; James R. Killian, Jr., '26, Chairman of the M.I.T. Corporation; Nevin S. Scrimshaw, Head of the Department of Nutrition and Food Science; and Robert C. Wood, Head of the Department of Political Science and Director of the Joint Center for Urban Studies of Harvard and M.I.T.

There will be luncheon for all visitors and a dinner for adults, including entertainment by an M.I.T. vocal group. Further information and reservations are available from the M.I.T. Alumni Center of New York, 295 Madison Avenue, New York, N.Y., 10017.

St. Louis Conference

Speakers at the M.I.T. Midwest Conference on April 12 at the Chase-Park Plaza Hotel, St. Louis, will include Raymond L. Bisplinghoff, Dean of the School of Engineering; John F. Collins, Visiting Professor or Urban Affairs; Samuel A. Goldblith, '40, Professor of Food Science; Howard W. Johnson, President of M.I.T.; Robert W. Mann, '50, Professor of Mechanical Engineering, and Irwin W. Sizer, Dean of the Graduate School. The day's topic will be "Man/Food/Environment—the Challenge for Survival." Reservations and further information are available from the M.I.T. Midwest Conference Office, 916 Harvard Street, St. Louis, Mo., 63106.

In connection with the M.I.T. Midwest Conference, the Board of Directors of the Alumni Association will meet in St. Louis on Sunday morning, April 13; and on Sunday afternoon officers and directors of all 73 M.I.T. alumni clubs in the U.S. and Canada have been invited to a Club Officers Workshop under the direction of G. Peter Grant, '35, Director for Clubs of the Alumni Association, and the Alumni Club Advisory Board.

Alumni Calendar

Baltimore—April, 10, Thursday, 6:30 p.m.

—Dinner Meeting, Holiday Inn Downtown. Speaker: R. Dixon Speas, '40, President of R. Dixon Speas Associates, Subsidiary of Planning Research, Inc., of N.Y. Subject: the results of his organization's latest survey of the nature of air congestion at Friendship and Dulles Airports.

Boston—March 13, Thursday, 12:00 noon—Luncheon, Union Oyster House, 41 Union St. Speaker: James M. Austin, '41, Director of the M.I.T. Summer Session. Topic: the economics of air pollution.

Boston—April 10, Thursday, 12:00 noon—Luncheon, Union Oyster House, 41 Union St. Speaker: Frank T. Parrish, Jr., Vice President, Fidelity Management and Research Company. Topic: the financial investment outlook for 1969.

Buffalo—March 13, Thursday, 6:00 p.m.—Dinner Meeting, Lord Amherst Restaurant. Speaker: I. A. Holkstra, Director of Air and Water Pollution, Erie County. Topic: water pollution.

Houston—March 12, Wednesday, 6:30 p.m.—Joint M.I.T./Harvard Business School Dinner Meeting, Marriott Motor Hotel. Speaker: Arnold E. Amstutz, '58, Professor of Management. "Mathematical Simulation of the Stock Market"

London, England—March 3, Monday, 12:30 p.m.—Buffet Luncheon Meeting, 87 Jermyn St.

New Haven—April 3, Thursday, 5:00 p.m.—Catered Dinner, Anaconda Research Center. Speaker: Cyril Smith, Professor of Metallurgy and Humanities. There will be a tour of the Center.

New York—April 17, Thursday, 8:30 p.m.—M.I.T. Symphony Concert at Carnegie Hall. Cocktail Party and Buffet from 6:45 to 8:05 p.m. Black time optional.

New York—April 21-22, Monday and Tuesday,—Seminar, Arden House, Harriman, N.Y. Speakers: Michael W. Blumenthal, President, Bendix International; Professors Donald Carroll, '58, Manson Haire of the Sloan School, and others. Topic: Strengthening management for the Seventies.

New York—April 30, Wednesday, 12:00 noon—Harvard Club. Speaker: Mortimer Rogoff, Vice President of John Diebold, Inc. Topic: "Next Great Growth Industry"

Newark—March 28, Friday, 6:30 p.m.—M.I.T./Wellesley Joint Dinner Meeting, Stauffers-The Mall. Richard M. Douglas, Professor, Head of the Department of Humanities will moderate a panel of M.I.T. and Wellesley students on the topic "M.I.T. and Wellesley: Two Campuses."

Providence—April, 10, Thursday, 12:00 noon—Luncheon "Get-together" at the Johnsons Hammock.

Seattle—April 3, Thursday—M.I.T./Wel-

lesley Joint Dinner Meeting, time and place to be announced. Speaker: Harold E. Edgerton, '27, Professor of Electrical Engineering.

Worcester—March 26, Wednesday, 6:00 p.m.—Dinner meeting, Sterling Inn. Speaker: Paul R. Gross, Professor of Biology. "Towards a Chemistry of Life"

Deceased

Kenneth Seaver, '00, January 15*
Jeremiah Colman, '01, February 16, 1967
Howard Baetjer, '02, May 1, 1968
Charles Boardman, '02, January 1, 1968
Augustus H. Eustis, '03, January 8*
Henry Kramer, '04, May 11, 1966
Mrs. Edward Pearson Ripley, '05, July 2, 1968
Emil Steinberger, '05, September 6, 1968
Ralph L. Dyer, '06, December 31, 1968
Charles F. Willis, '06, December 10, 1968*
Harry H. Bentley, '08, November 9, 1968
Chester J. Randall, '10, January 8*
Wright Shuttleworth, '12, August 3, 1968
Harry J. Baker, '14, May 10, 1968
Albert F. Hill, '14, July 24, 1968
Clarence T. Hansen, '15, December 23, 1968
Henry E. Rossell, '15, January 7, 1968
Austin B. Reeve, '16, December 2, 1968
Jay J. Sindler, '17, December 25, 1968
Gerald W. Thomson, '17, December 29, 1968
Frederick W. Griebel, '19, March 20, 1968
Raymond G. Lafean, '19, September 6, 1968
Edgar H. Lawton, '19, January 6, 1968
Jesse Stam, '19, April, 1968
Paul N. Anderson, '21, December 10, 1968
Watts S. Humphrey, '21, August 20, 1968
Merton F. Ticknor, '22, January 21, 1968
Carl J. Conkey, '23, October 14, 1968
Harold G. Crowley, '23, October 25, 1968
Ernest A. Davis, '23, November 17, 1968
Dean Lewis K. Downing, '23, October 19, 1967
Charles F. Daley, '24, October 31, 1968
Harold C. Pearson, '23, January 24
George W. Stewart, '24, July 3, 1967
Stanley W. Davis, '25, January 11
Rufus E. Fulreader, '26, February, 1965
Charles G. Hutzler, '26, July 2, 1968
Howard A. Kelty, '28, January 7
Harold W. Greenup, '29, December 18, 1968
Kenneth Tator, '30, January 11
William E. Cranford, '31, December 25, 1968*
Thurston D. Owens, '32, December 4, 1968
John C. Raaen, '33, June 28, 1968
Bellamy A. Earnshaw, '34, 1960
Richard M. Crossan, '40, November 30, 1968
Robert W. Byloff, '43, January 18*
Albert A. Henriquez, '46, December 25, 1964
Marc J. Seelenfreund, '68, December, 1968

To R. Gordon Cook, '62, the *Review* extends its apologies for the erroneous report of his decease.

* For further information see Class Review

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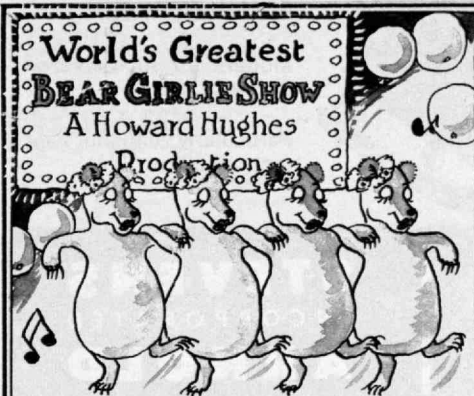
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John F. Hennessy, Jr. '51

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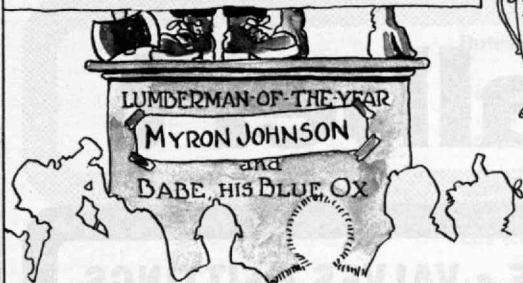
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Washington, D.C.
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ALUMNI *as noted*

Recent alumni doings as reported by those diligent fact-finders, the Class Correspondents



Irving McDaniel '16 on Las Vegas: "Got tired of looking at (undressed) girls, but they did have some wonderful horses and trained bears."



Named 1968's "Lumberman OF THE YEAR" by the Western Wood Products Association, was Myron Johnson '42

Deep Freeze Research



On a South Pole research project, John Bower '67 reports: Temp ~85° below; Winds ~65 mph

Indignant Seaweed Lovers?



While collecting seaweed off Zamboanga (Phillipines), the boats of Ernest Loveland '15 were attacked by pirates



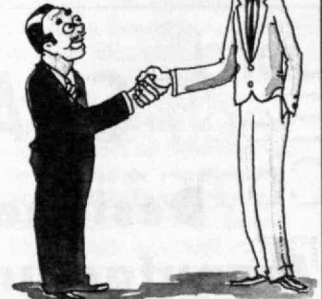
INDIVIDUALS NOTEWORTHY



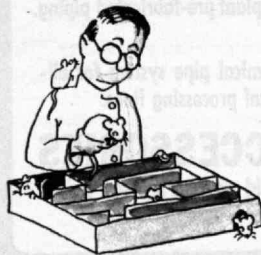
David E. Webster '50 is 1968 Nantucket Backgammon Champion



Paul Gray, Class of '34, has been named Class of '22 Professor



Two alumni will meet at the next Governors' Conference: Gov. Luis A. Ferré '24 of Puerto Rico, and Gov. Francis W. Sargent '39, Massachusetts



Prof. Don C. Fowles '61, University of Oklahoma, teaches: psychological psychology; psycho-physiology; and experimental psychopathology



U. of Oklahoma's new president, J. Herbert Holloman '44, appoints lengthy committee to recommend ways of making it better. More psychology?

OFFSHORE REVELS

Last June the Class of '48 staged its 20th Reunion on an island, Martha's Vineyard



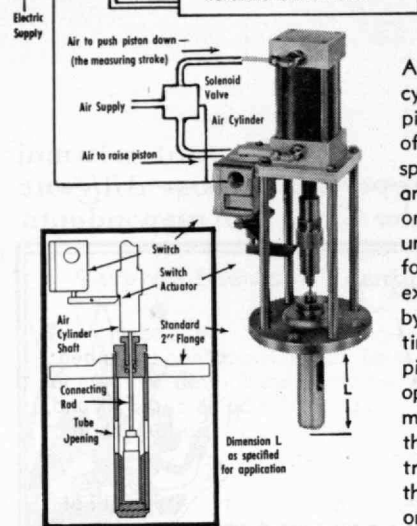
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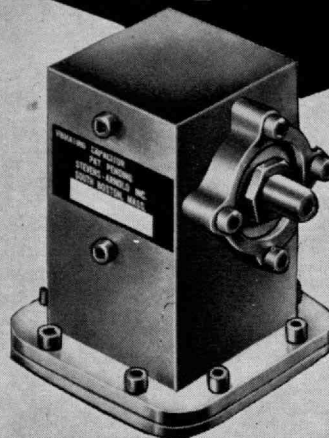
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Class Review

late news

of note

95

A telephone call to *Luther Conant* revealed that he is confined to his bed now, which we are sorry to learn! As for me I am grateful to be able to walk and, weather permitting get out for a short turn almost daily.

We were sorry to learn of the death of Jim Driscoll, '96. He and I were a couple of old-timers at many Council Meetings. —*Andrew D. Fuller*, Secretary, 1284 Beacon Street, Brookline, Mass. 02146

96

Greetings to classmates were sent to your late secretary from Schenectady by *Will* and *Dorothy Coolidge* at Christmas. *Charles Hyde* also sent his best wishes from Berkeley, California. *Harold Boardman* included the following: "I spent the summer months at my cottage on Hancock Point on Frenchman's Bay opposite Bar Harbor. I took many trips thru the surrounding country and the unsurpassed scenery of Mt. Desert Island. . . . My cottage was built by my father in 1879, the third of more than seventy-five which are now there, and I distinctly remember the event. I am now called the 'King' of the Point as I am the oldest resident.

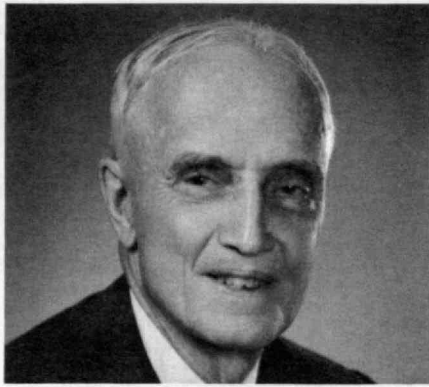
"I am now at home in Waterville where I have my wood working shop in the basement and I hope to spend a lot of time there before next June. However, I find that I tire more easily than I did in the 'old days' which is strange!

"I still drive my car and have recently bought a new one, and take much pleasure with it. I shall put it in cold storage when the going gets slippery as my son and his wife worry about me."

Included in the letter was a delightful picture of Frenchman's Bay which was taken from the Boardman porch and was published in the *Down East Magazine*. There was also a picture of a handsome gentleman which was taken for the Rotary Club's records.—*Clare Discoll*, Reporting Secretary, 129 Walnut Street, Brookline, Mass. 02146

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Copy for this issue of *Technology Review* was due from your Secretary about January 15. Information reaching him after that date will be reported in the April issue unless he desires to insert it in the Late News column.



Augustus H. Eustis, '03



Can you identify the '03 men in the picture to the left? It was taken at a reunion and sent in by Bill Lounsbury, '03, who is able to identify only one of his classmates—Walter Regestein, Course V, front center. (Bill is, of course, able to identify himself standing at the far left.)

98

Mrs. Otilie Jones, widow of *Fred Jones*, is living with her daughter in Youngtown, Ariz., at 12847 113th Avenue North. She reports "contentment, with a companion each day while Mary Ella works in the bank." She is a regular correspondent of your secretary, her step-daughter, and happy to say "the only complaint is poor eyesight." You may be interested to know that Fred's papers were put in book form, *Old Houses in Needham, Massachusetts* and the books are being distributed by the Needham Historical Society.

Two more classmates are added as of September 26, 1968, to the three (listed in the January issue) of the 50 eldest living alumni. They are *Joseph W. Ames*, January 13, 1876 and *Lyman F. Hewins*, March 6, 1876, making a total of five from the Class of 1898. Congratulations to them—Mrs. *Audrey Jones Jones*, Acting Secretary, 232 Fountain Street, Springfield, Mass. 01108

00

Kenneth Seaver, prominent Oakmont civic leader and Pittsburgh businessman, died January 15 at his home in Oakmont, Pa., at the age of 91. Mr. Seaver had been Senior Vice President and a member of the Board of Directors of Harbison-Walker Refractories Company where he was employed from 1902 until his retirement in 1947.

A native of Woodstock, Vt., he received a B.S. at M.I.T. and then went to work in Pittsburgh for the Pennsylvania Railroad, and later the American Bridge Company, before joining Harbison-Walker in 1902. Mr. Seaver was a founder of the Pittsburgh Metallurgical Company, now a division of the Air Reduction Corporation and a life member of the A.I.M.E. In addition to service on the Oakmont School Board, he was also a director of Allegheny General Hospital, and an elder in the East Liberty Presbyterian Church. He was a noted collector of etchings, engravings and prints and donated his collection to the Carnegie Institute.

He is survived by two daughters, Mrs. Kenneth Hewitt, of Oakmont, and Mrs. James Verner, of Ft. Lauderdale, Fla.; five grandchildren and 12 great grandchildren.

03

Well classmates, the inevitable has at last removed from our remaining group *Augustus Eustis*, Course XIII, our long faithful class treasurer. He, like brother Fred, served us unceasingly up to his passing. By his quick humor and cheerful optimism, Gus was ever my inspiration in my arduous duty as Class Secretary. I received a letter from his secretary on January 9, stating that he had flown to Fort Myers Beach, Fla., on January 1. On Thursday, I received the news that he had become ill, developed pneumonia and had been taken to the hospital on Saturday. His son, Fred, took a plane on Sunday for Florida; daughter Peggy, with her family were there, having accompanied him on the trip. They, fortunately, were present when he passed away on Wednesday, January 8.

A "modest" career

His "modest" career was related in a Boston paper and I paraphrase it here. Augustus H. Eustis, of Canton Ave., Milton, prominent mining engineer and long active in civic, social, and yachting circles, died Wednesday while vacationing in Florida. Mr. Eustis was 91 years old. He maintained a business office for many years at 131 State St., Boston, and was President of the Virginia Smelting Company.

A graduate of Harvard College, as was his brother, Fred, in the class of 1901, he entered M.I.T. for a masters degree in mining engineering and graduated with the class of 1903. He once summarized his business career as spending "the first half of my life in or around a mine and the second half of my life in or around a chemical plant." He was associated with the Virginia Smelting Company from its incorporation in 1909 when it was established as a smelting company for treating ores mined by the Eustis Mining Company in Canada. The firm became a chemical manufacturer at the close of World War I.

Born in Milton, Mass., and a graduate of Milton Academy before entering college, he was an ardent yachtsman who participated in international competitions. In 1911 he represented the Eastern Yacht Club in a match race with boats of the Imperial Yacht Club of Germany.

In a report of his life at the 50th anniversary of his class, he told classmates, "Woven in with my work and a happy home life are my many enjoyable days of sailing and yacht racing and above all, a very short but happy service in the Naval Reserve on active duty as Warrant Boatswain. I have often thought I would like to be remembered as an Engineer-salor Boatswaine U.S.N.R.F."

He was the husband of the late Elizabeth Swann Bowditch Eustis and leaves three children, Mrs. Elizabeth Williamson of Blue Hill, Maine, Mrs. Margaret Richardsen of Brookline, Mass., and Frederick of Milton, Mass. A memorial service was held at the First Parish Church in Milton, Sunday, January 12 (contributions to be sent to Milton Academy).

More cheerful news however arrives from *Bill Lounsbury*, Course VII, now in distant Wisconsin. Of late years while active physically, he lived at Fort Myers, Fla., the familiar abode of many of our alumni. When the present lack of ambulation occurred, at age 89 in February, he decided his new address would be Nazareth Rest Home, 814 Jackson St., Stoughton, Wisc. William was a "Booster" for M.I.T. many years ago, for he was appointed November 9, 1936, by President Karl Compton as Honorable Secretary of Northern Wisconsin, with an office at Duluth. The association flourished until the close of World War I.

He lost our Year Book in changing residences but found the photo, reproduced here, of a former reunion. He now wishes to learn the names of others (than himself and *Walter Regestein*) in this photo.

Stanley Foster, Course X, states that he is "still going strongly" and your secretary only awaits balmy weather to visit him and secure the details of his interesting career.

John J. Dooley, Course VI, has a new address: 163 Summit, Ramsey, N.J. *Clyde MacCornack*, Course I, also has a new address: First Pennsylvania Bank and Trust Co., 15 Chestnut St., Philadelphia, Pa.—*John J. A. Nolan*, Secretary, 13 Linden Avenue, Somerville, Mass. 92143

04

A holiday greeting from Martha and Maynard Holcombe says that they are well and he is playing golf but notes that lately the mileage he gets from his tee shot is a bit less than it was years ago.

A note from *George Kaiser*. "About a month ago my daughter and I returned from a two months trip to Europe. In a rented car we traveled through five countries from Holland to Italy. We saw some wonderful mountain scenery in the Swiss, Austrian and Italian Alps. We were impressed by the marvelous four lane construction in the Italian Tyrolean Alps. Because of the narrow valleys the express ways were built into the sides of the hills about 100 feet high with supporting concrete columns. They were connected by viaducts, often with villages on both sides far below. Remarkable engineering."

I am sad to report that Mrs. *Frank Davis* passed away suddenly at home November 5, 1968. She will be well remembered by those who attended our many reunions. Our sympathy goes out to Frank and family. Mr. and Mrs. Davis had been married 58 years. At present Frank, Junior, is caring for his father and takes him regularly to the office. More power to you Frank.—*Eugene H. Russell, Jr.*, Secretary, 82 Stevens Road, Needham, Mass. 02192

05

This will acknowledge receipt of Christmas cards from nearly all of our active members but very little personal news. I presume we are all much alike, so many cards to write, so many envelopes to address, stamp and stick, that we don't take time to write of ourselves. Some do. For instance, *Sam Seaver*, Box 91,

Markham, Ontario, writes: "I too have been lucky to be in such good health and so active at 87. We came out to Markham in 1939, then just a village of about 500. Real country town. I bought a farm of 110 acres. Only played at farming but rented it for the most part. The town has grown and now has a population of over 10,000 and on January 1, we graduate from a village to a town with a mayor instead of a Reeve. Ha! Ha! We now have super markets and everything up to snuff. While we are in the township of Markham our northern border is on the edge of the town. I now hold only about 30 acres as 75 was taken to make a park and lake and two of my sons (one a realtor) have about two acres where they have built their homes. They have five children. My daughter Mary lives in Scarboro (a few miles south) with four children and my daughter Dora has two children and lives in Renfrew about 245 miles north west, up near the Ottawa River. My oldest son and one daughter live with us. We are about 22 miles from Toronto but with the fine highways it only takes about 30 minutes to reach downtown Toronto. And now we come to Xmas again. All the family will be with us (with the 11 grandchildren) and 26 of us will fall in on the big turkey. Of course I'm lucky and healthy and happy and was glad to hear you were in good health and active in your town."

I think that sort of a letter should prod several '05 men to write Sam and at least say "Hi!"

Proud of kin

Harry Charlesworth, East Greenbrook Road., North Caldwell, N.J., tells this of his fine family: "As to 'Yours truly', I am glad to say that I am still going fairly strong. Although slowing-up somewhat I am quite active both here and at the farm in New Hampshire, where we spend considerable time. Rosemary, and daughter Anne, have continued their antique and gift shop in Chatham, Mass., where Rosemary has a summer home. In other seasons she frequently does interior decorating. Her son Tim is just starting college. Roger, who as you know, has been Work's Manager for Western Electric at Oklahoma City, retired this spring. He will continue to live

in Oklahoma for the present but, I believe, will eventually return East. He and Sally have a son and three daughters, the two older girls are in college. Roger has a cottage at Kittery Point, Maine, which he greatly enjoys. As this is only a short distance from the Farm we are often able to see each other. Sandy, is still living at home with me. He is associated with Rosemary's husband in architecture. They keep very busy here in New Jersey as well as on Cape Cod. He has an interesting cottage on the shore there, which he rents in the summer and enjoys it himself at other times. Dick, as you may remember, is with International Harvester and was located in Boston. This summer he was transferred to Albany, N.Y., as Manager of Retail Sales, for the Albany District. He has found a very interesting new home overlooking the Hudson River Valley for Ann and their four daughters. He, too, has a cottage in Maine, near Boothbay Harbor, which the family very much enjoys." Harry is rightfully proud of his kin. Are you of yours? Of course.

Gilbert Tower had had a cataract operation, which was apparently very successful. He was "in the middle of recovery" and wrote a long letter "with the help of magnifying glasses." Bravo, Gilbert! He adds, "I have some grandchildren I might tell you about. The oldest (of ten) Edward Tower is a teaching fellow at Harvard, on the point of getting his Ph.D. in economics. My son, Osgood, lives in Virginia, just south of Washington, has an important job with the Air Force, involving contracts and procurements. His oldest is at Peabody College, Baltimore, studying music. Joffrien (6' 2") is at a college in Tennessee and Devereaux in high school. My daughter, Frances, lives at Falls Church, Virginia, has two boys and a girl. Her husband is one the staff of the Federal Reserve Board." I am not sure that I have the branches and limbs of the family tree just right but it must be a tree to be proud of. Thank you, Gilbert.

Brief notes

Charlie Smart, The Crossway, East Acres, Troy, N.Y. 12180, says: "I published Volume II *The Makers of Surveying Instruments in America since 1700* last March. I was five years getting it

ready, but then, I did not work at it every day. Teledyne Inc., of Los Angeles, Calif., took over Gurley in April. I had been with Gurley 48 years and a director for over 42 years."

Lloyd Buell, 1618 St. John Road, El Paso, Texas 79903, says that he and Eleanor are well except for her eyes and he encloses a hand-written copy of a poem, "I've worked for a Silver Shilling" by Charles W. Kennedy. It is beautiful. Lloyd is keeping his hand in by helping with their accounting (Black's Nurse) "plants not infants." He also asks, "isn't it time for another assessment?" and encloses his ante. As a matter of fact it is and you will receive an official announcement very soon; with this will be a list of living members and their addresses.

Ted Steel's daughter writes, "Ted has kept well, aided by a good constitution and a shot." We have known for some years that Ted's sight is not good, but, if you write, I am sure he would get the message (and a thrill). Address: Edward T. Steel, 4535 Howard Ave., Western Springs, Ill. 60558.

Hallet Robbins: "Once again I am able to report my survival! The old model had to be put in the shop for repairs twice this year but the mechanics did a good job and it is in good shape now, with plenty of mileage still in it, I hope!"

Bill and Peg Ball are permanently located in Florida watching their new home being built. Bill seems quite surprised on attending an M.I.T. function in (or around) Sarasota, that there were 100 M.I.T. men in his area. "Pretty good for a small college," says Bill. Where do you get that small college idea, Bill? Bill has accepted appointment as Assistant Secretary for the Class. He should be a good news gatherer and makes a good secretary when I abscond with all your money.

Hub Kenway still gets into his office (in Boston) quite regularly; says Helen has recovered from her broken hip operation very nicely. I am watching for the results at their farm in West Franklin, N.H., where her son, Oliver Marcy, has planted 150,000 tulip bulbs on a co-operative experiment with the Department of Agriculture. Starting with 40,000 bulbs in 1966, they have apparently been very successful. Come up in May and see them. I had to work rather hard with this one.

We are informed that **Emil Steinberger** died on November 20, 1968.

Bert Files is now living with his son Dick (and Sheri). Talking with his daughter, Josephine, I learned that Bert is ambulatory, "getting along pretty well and will make Alumni Day, if possible." We hope. Address: Manter's Point, Plymouth, Mass. 02360. **Henry Buff** is still at the Forest Hills Nursing Home, 101 Brookley Rd., Jamaica Plain, Mass. 02130. I have just talked with him, he says he is fine, nothing wrong. A nurse

said, "He's doing O.K., goes to Kiwanis and other things regularly. Henry has apparently found a fine haven.—**Fred W. Goldthwait**, Secretary, Center Sandwich, N.H. 03227

06

Thanks for all those Christmas Cards and especially for the messages and news that many of them carried. One card was from the *Reveiw* signed by the nine members of the staff. **Jack Norton** allowed he had no particular news from Tryon. It had been unusually cold and they even had a snowstorm "out of place at this time of year. I feel better than I did a year ago but do almost nothing." Applies to many of us Jack but I guess **Bob Cushman** is an exception. His wife Ruth has been in a nursing home for several years and he drives to see her every day, also takes a long walk. He he has added another hobby to his many interests, a study of electrocardiography. If he outlives his wife Bob says he has a strong desire to go to sea, preferably to Australia and concludes, "By the way, like many other classmates I am proud of the fact that I am a greatgrandfather."

Fay Libbey said he had recently had lunch with **Henry Mears** at the home of a mutual friend. Like many of us, Henry had been having some trouble with arthritis but drives the car. Fay had also talked recently with Bob Cushman by phone. And why don't you talk soon with a classmate, then send the news along to the class secretary? **Mary Fletcher** told us that **Harry** was recovering (at Christmas) at Jefferson Hospital from that operation many of us have had, and she planned to spend the day there with him. The card from Johnson and **Eleanor M. O'Connor** was an unusual one from Venice where they "spent an inspiring month at the Grand Hotel working on Vol. II of the *Vocabulary Builder*."

The cards from **Frances Fuller** and **Sadie Sherman** carried interesting notes and we had cards from **Vera Philbrick**, **Agnes Coes**, **Ann Darling**, **George Guernsey** who gets his exercise playing golf and shuffle board, **Allyn Taylor** who says he is still pegging away, and **Carroll Farwell** who continues to be on the Board of Directors of **Fay, Spofford & Thorndike, Inc.** Their 1969 Greetings folder carries photos of three important bridges they designed.

Jim Wick admits he is a little unsteady at times but he gets to the Historical Museum once a week—when he can get a chauffer! Their daughter **Emily (M.I.T. '51)** who is an M.I.T. professor, was in Europe for three months and held seminars in Sweden, Holland, and England.

The Boston *Herald* last August carried a photo and article on the society page of interest to us, reporting the marriage of **Jim and Alma Kidder's** grandson,

Robert Todd Kidder, son of **James Norton Kidder** and **Priscilla**. Marion spotted the article and clipped it for me.

Classmates deceased

The February notes carried a report of the death on September 27 of **Charles Holmquist** in a York, Maine Hospital after a long illness. In her reply to my letter of sympathy, Mrs. Holmquist included some additional information about Charles' career. He had retired in 1948 being then the Director of the Division of Environmental Sanitation of N.Y. They continued to live in Albany, spending the summers in York, Maine, until 1966, when the Albany house was sold and they moved to York, to the cottage they had been winterizing over the years: "Carl loved it here, as do I, and it is here that I shall continue to live as long as I can." Mrs. Holmquist was Charles' second wife and they had no children but he is survived by two married daughters, Mrs. Loisette Enderle, of Albany, and Mrs. Brenda Griffin, of Hyde Park, four grandchildren and five great grandchildren.

Just in time for these notes I received a report of another death—**Charles Francis Willis** on December 10—from his wife who thoughtfully enclosed an obituary from the *Arizona Republic*, also the following editorial from the *Phoenix Gazette*. "Charles F. Willis is dead and with his passing Arizona lost one of her most devoted sons. The likes of this man—extraordinarily capable in such diverse fields as mining, music, newspapering, education and governmental affairs—shall not pass among us again, and he will be sorely missed. By birth, Mr. Willis, or Charley as so many fondly knew him, was a Bostonian, but by his own early choice he joined Arizona's then tiny family, in 1912, when the territory became a state. He cherished Arizona and Arizona embraced him, so in death if not by birth, the state claims him jealously as one of her own.

"Born in Boston, Mr. Willis was a musician and organized a dance orchestra during his college days at Massachusetts Institute of Technology. He once composed and directed a pop musical score for the Boston Symphony Orchestra. He earned a mining engineering degree from New Mexico College of Mines in 1916. For a while Charles worked for mining interests in New Mexico and Colorado; was a consulting engineer, and for six years was professor of mining and metallurgy at the Univer. of Arizona, becoming the first director of the Arizona Bureau of Mines. He was credited with helping establish the Arizona Dept. of Mineral Resources in 1938 and raised funds for the Mineral Museum; he was publisher of *Pay Dirt* from its inception in 1938 and in 1966 was awarded the Legion of Merit of the Am. Inst. of M.M. and Petroleum Engineers. Much more could be included about this remarkable man's career of which his family can be justly proud. Surviving, besides Mrs. Willis are their two daughters, a brother, two sisters, four grandchildren and seven great-grandchildren. A note of

sympathy has been sent to Mrs. Willis for the family."

With sorrow I have to report five other recent deaths: *Arthur Muirson Bellamy* on October 12. A note enclosing an obituary clipping was thoughtfully sent to me by an '04 man, Frank W. Milliken; *Roger Leavitt Rice* died November 11; *Frederick W. Chandler* on October 20; *Arthur L. Sherman* on December 5; and *Ralph L. Dyer* on December 31. Their careers will be included in later notes.

Changes of address

Anthony Paul Mathesius is now at McCormick, 23 Brooke St., West Sayville, N.Y. 11796; *Henry Bowers Thomson* is at 5319 Nakoma, Dallas, Texas 75209.

Speaking of mergers, as we did last month, the *Boston Herald* of November 15 carried a heading of interest "Yale Drops a Barrier Will Admit 500 Girls." "We had, was it six, coeds!—*Edward B. Rowe*, Secretary-Treasurer, 11 Cushing Road, Wellesley Hills, Mass. 02181

07

These notes are being written just following the Christmas season and I have been looking over the several hundred greeting cards the Walker family has received. Among them are a number of '07 men who add a word of personal greeting. I am happy to report general physical improvement in our President, *Don Robbins*, and our Assistant Secretary, *Tom Gould*. We also can report that medication is helping his glaucoma.

At our 60th reunion, we became acquainted with *Harry Hall*, and his wife Margaret. Harry passed away shortly after returning from the reunion; Margaret has kept in touch with me regularly since then. Her Christmas note indicated that she had a serious illness last summer but has since recovered. *John Bradley*, has been in correspondence with *Frank MacGregor* and *Albert E. Greene* who report that they continue active along various lines. Albert recently procured a patent and John continues his hobby of collecting shells of all kinds as well as postage stamps.

Because of my inability to drive to Cape Cod for my vacation this fall, I was unable to spend part of a day with *George Griffin* and his family. He wrote me a long letter telling of their activities. Most of his children, and now his grandchildren, have taken up teaching or are training to become teachers. *Rena Hastings*, writing for Hudson, mentions how badly Hud is handicapped by his poor eye sight, hearing, and recently, by poor circulation which interferes with his walking.

A six mile hike

In *The Crusader*, a paper which covers Baptist doings, I note a paragraph and pictures of *Milton E. MacGregor*. Shortly after he moved to the Baptist Home on Commonwealth Avenue, Chestnut Hill,

he had a serious stroke. His has completely recovered from this and is again his old active self. Recently he walked from the Home to Needham, a distance of about six miles.

Cool, clear water

Willis Waldo, although over 85 years of age, keeps very active in his home state of Florida. He has just completed the design and construction of a 10,000 gallon treatment plant for purifying well water. It is adapted for small, 30' by 100' house lot, the usual size in Florida. Florida well water needs to have the sediment removed. It is then aerated, filtered, and chlorinated. Willis reports that his treatment results in cool, clear, and tasteless water at a cost of approximately \$200 per lot.

First honorary director

Jim Barker sent me a long, handwritten letter which I appreciated very much. He is still an active member of the M.I.T. Corporation and following the developments of our Alma Mater with great pride and absorbed interest. I think I should mention the honor given to Jim this past year. *Sears Roebuck & Co.* and the *Allstate Insurance Co.* (John was their Chairman of the Board for 15 years) made him the first honorary director after (in the case of *Sears*) about four decades of very active service as a working member of the Boards. Congratulations, Jim, an honor well earned.

One change of address to record: *John Evans*, 1624 Tremont Place, Denver, Colorado 80202. As I shall be in the hospital undergoing surgery in February, I ask that you write me after reading this set of notes so I will have news items to go into the May issue of the *Review*. —*Philip B. Walker*, Secretary and Treasurer, 18 Summit Street, Whitinsville, Mass. 01588; *Gardner S. Gould*, Assistant Secretary, 409 Highland Street, Newtonville, Mass. 02160

08

Lack of news is still a problem, so won't you help and send some in?

We are sorry to report the deaths of the following: *Harold B. Pickering*, on March 5, 1968; *Edward J. Scott*, in May, 1966; *Hugo F. Kuehne*, on November 26, 1963; *Joseph G. Reid*, on June 1, 1968; *Warner H. Keitaber* in November, 1965; *William B. Given, Jr.*, on January 30, 1968; *Carl E. Hollender*, on October 25, 1968; *Allen T. Weeks*, on January 7, 1968; *Harry Bentley*, on November 9, 1968.—*H. Leston Carter*, Secretary, 14 Roslyn Road, Waban, Mass. 02168; *Joseph W. Wattles*, Treasurer, 26 Bulard Road, Weston, Mass. 02193

09

We regret that for the past two months there have been no '09 notes in the *Review*, although on each occasion we hoped that some news would arrive be-

fore the deadline. However, we are very fortunate this time. Early in December we received a note from *Art Shaw* now at his winter residence on Longboat Key, Sarasota, Fla. "Betty and I arrived here last Friday (November 29) and are about settled in for the winter. Our motor trip down was comfortable and uneventful. Each year the trip becomes less tiresome—in spite of our advancing years—owing to the increasing mileage of limited-access roads. If we wish, we can go from Auburndale well into North Carolina on divided highways without a traffic light, and similarly in Florida to within 50 miles of our destination. Occasionally, however, we like to spend a day more leisurely on secondary roads. My correspondence with *Lehmann* is still in progress regarding planning for the disposition of class funds after the last of us has gone. I will let you know as soon as something definite develops."

Art also enclosed a note from *Weston Radford* who formerly lived in Oshkosh, Wisc., but who moved to Fort Lauderdale about three years ago. He writes: "I must have mislaid the letter from *Henry Spencer* as mentioned in your letter of September 1968, regarding the 1969 Alumni Fund solicitation, as I cannot find it anywhere. Anyhow, I am sending you a check for \$50.00 as a donation to Student Housing, and I wish you would turn it over to him for proper credit. Nothing exciting has happened to us for a long time. We live permanently in Fort Lauderdale and like it. Of course we go to Wisconsin every summer to see grandchildren, sons and daughters-in-law, but we pass up northern trips in the winter. We expect to take a three-week Caribbean cruise over Christmas and New Years and it may well be our swan song. We have been fortunate in our travels, so if it is our last, we have had our share. We are hoping to get up for the 60th, which is really quite an occasion. But now we cannot make our plans too far in advance. Best regards to you and the rest of the '09ers."

We also received a note from *Leon Healy* stating that he and his wife Ruth were still active and were planning to attend the Sixtieth Reunion next June.

Thousands will wonder

It has been a long time since we have had word from *George Witmer*, one of our Course VI electrical engineers. For some time he lived at Ormond Beach, Fla., partially incapacitated physically. He is now living at the high-class Suncoast Manor Health Center at St. Petersburg (Zip code 33705) which he states is no place for a poor man, but he recommends it as "a place for alumni who are neither rich nor poor with nobody to look after them. . . . I am more contented, more comfortable and happier than I have been heretofore." George's wife died in November 1968 after fifteen and a half years of illness and there are no close relatives. He states that his heart, lungs and stomach are as good as ever, his blood pressure about normal, and "all their (nurses) watching over me

can be a nuisance." He asked a friend, who was suffering from several maladies, which was the worst and she replied "old age." George agrees with her heartily. He writes: "The Episcopal Church is starting Trinity Preparatory School to prepare students for the Technological College which the University of Florida is building. I have given them some help and some money and promised them more money. As a reward they have painted on the first building which they have built in letters 6 inches high:

GEORGE S. WITMER SCIENCE BUILDING

Now thousands of people are going to wonder who George S. Witmer is." George retains his interest in M.I.T. and is a generous contributor. He states that he will be unable to attend our 60th since he cannot travel without an attendant. We all wish him well and undoubtedly he would be most pleased to receive messages from classmates.

Classmates deceased

In the October/November *Review* we told of the passing of *Lester King* and that we had written to Mrs. King expressing our sympathy. We also requested that a copy of the *Review* be sent to her and she replied: "Two copies of the October/November *Review* came to me and I am very grateful for them. I gave one copy to his daughter, Margaret King Stroop and shall treasure the other one. Thank you so much for sending them to me." She has written further telling of Lester's interests. "During his entire life his great interest was the sea and he spent many happy days sailing on Long Island Sound, especially after his retirement in 1959. Until he was ill in 1965, he owned his own small sail boat and spent many happy hours in it. Lester was very much interested in working with a group of disabled people, many of them in wheel chairs. The organization is called 'Resources Unlimited.' He met each Wednesday afternoon for a social get-together and he never allowed anything to interfere with his attendance. Both Peggy and I enjoyed the earlier copy of the *Review* and are so glad to have it."

In the December *Review* we told of the passing of our class treasurer, *John Davis* and that he found enjoyment in designing and painting his own Christmas cards. In an pre-Christmas edition of the *Cambridge Chronicle* under a heading "They Designed Their Own", the following appeared: "One way to solve your Christmas card problem is to design your own cards. We have known two talented Cambridge men who did just that: John F. Davis, president of our city water board, and Dr. Erwin Raisz, the world famous cartologist. Both were our friends and neighbors and both have died recently. John Davis, who took up painting as a hobby during a prolonged illness in his mature years, was fond of depicting familiar scenes on his cards—the grandfather's clock in his Arlington street home, the crystal chandelier there, a tree near his sum-

mer home in Hingham, and once a dramatic picture of lightning striking the tower of his beloved North Congregational Church. His cards were usually painted in the same shade of blue on paper which he, as an expert on paper mill operations, chose with loving care. A pleasure to receive."

Shortly after Christmas we received two letters simultaneously, one from Peter Jones the son of Marion Jones (widow of *Reginald Jones*) and from Alfred Babcock, her nephew, each telling of her death from a cardiac ailment on December 26. Reginald's death occurred just 20 years earlier. Marion continued her interest in the Class and the Institute and she and her children have visited us at our home so that we know the family quite well. Surviving are: Betty, a daughter, (Mrs. Donald L. Fuchs) who is a Wellesley College graduate, lives in Chappaqua, N.Y. and is the mother of four girls, Kathy, Barbara, Betsy, and Dorris, ages 18 to 11; Reg, Jr., a partner of Arthur Andersen & Co., Public Accounting in New York City, who lives in Darien, Conn., with his wife, Judy, three boys, Reg (the 3rd), Ross, and Andrew, ages 9 to 2; Peter, a Senior Investment Advisor for the Standard Oil Company (N.J.) who lives with his wife Barbara in Short Hills, N.J., and their two boys, Peter, Jr. and Davis, ages 9 and 2; and a nephew, Alfred Babcock who lived with Reg and Marion all his adult life and still lives in Summit, a bachelor, former teacher, and in recent years an author. We have sent the sympathy of the class as well as our own to the family and also a contribution to the Overlook Hospital as a memorial to Marion.

As you read these notes your President and Secretary will be making preliminary plans for our Sixtieth Reunion in June.—*Chester L. Dawes*, Secretary, Pierce Hall, Harvard University, Cambridge, Mass. 02138; Assistant Secretary, *George Wallis*, Wenham, Mass. 01984

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Mrs. *Chester J. Randall* writes: "My husband died at his home at Naugatuck, Conn., on January 8, 1969. In these last rather inactive years he had great enjoyment in reading the reports of his classmates and activities of M.I.T. He leaves three children: Mrs. Dorothy Loft of Plantation, Fla., Mr. Benjamin Randall of Brooklyn, Conn., and Mr. Frank Randall of Terrysville, Conn., and four grandchildren."

Ralph W. Horne writes: "I have noted in the *Review* that you made reference to the death of our classmate *Allen Curtis*. My wife and I received a Christmas card from Allen's wife on which she related that Allen passed away very suddenly on September 12. He had been in fairly good health and his death came as a great shock to his family. I believe that I last saw Allen in May, 1968, when he stopped at our office to say hello, as

he did from time to time. We spoke regarding the upcoming Alumni Day at Technology and he indicated that he was not doing much driving since experiencing a heart ailment. However, he did not seem concerned regarding his physical condition."

Martin F. Tiernan, founder (with the late C. F. Wallace) of Wallace & Tiernan, Inc., died March 24, at the age of 85. A native of Charlotte, N.Y., and a graduate of the University of Rochester and M.I.T., he and Wallace established their company in 1913, and built a worldwide organization from their development of the first practical chlorinator. The company has since grown and diversified into chlorination, baking, flour milling, chemicals, pharmaceuticals, plastics, and industrial metering and feed equipment. Tiernan and Wallace jointly received the Edward Longstreth medal of the Franklin Institute of Philadelphia for their developments in chlorination, and Tiernan was awarded the Outstanding Alumni medal for the year 1946 by the University of Rochester.

Mrs. *Herbert G. Reynolds* writes: "Herbert is at home after two months in the hospital following a stroke. He has to spend most of his time in bed."

Your Secretary took his annual trip—this time to Caracas, Venezuela, where he spent a week with his wife's daughter who is now living there. It was a wonderful trip by ship and the water was very calm. The week I spent in Caracas was most enjoyable and I was delighted to see how well the Americans are treated there.—*Herbert S. Cleverdon*, Secretary, 120 Tremont Street, Boston, Mass. 02108

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The following came from Class President *Howard Williams*: "After graduating from the Institute, my first job was with Swift & Company in the stock yards in Chicago. After keeping me there only a few days I was sent to the Swift & Company plant in Omaha, Nebraska. While on that job I lived in Omaha in a house shared with several college graduates and we shared the costs on our meager salaries. It was necessary for me to get up at 5 o'clock each morning and take a trolley car from Omaha to South Omaha to the Swift plant; we started work there at 7 a.m. I recall that we received our wages in silver and gold pieces. And they were very small in those days—compared with what an M.I.T. graduate receives when he starts out today—but, of course, the present day graduate does not receive and never sees silver and gold coins.

Imagine the possibilities

"After about a year in this job, I received word from my professor in sanitary engineering (William T. Sedgwick, and what a fine man he was) asking me to accept a position with the Sanitary District of Chicago. So, off to Chicago I went where I worked at an experimental sewage disposal station at 37th Street

and the lake. There we had a number of young engineers and chemists working with Imhof tanks, trickling filters and the like in trying to determine the best method of taking care of Chicago's sewage when the "drainage canal" was filled to capacity. I guess Chicago, even in those days, had some of the "image" that the present mayor (Daley) appears to have given the city. The Sanitary District of Chicago was headed by what was termed the Trustees of the Sanitary District. These Trustees were elected by the voters in Cook County and one can imagine what "possibilities" that presented. I found out quickly that some of these Trustees were "politicians" pure and simple. These men were interested in one thing only: picking out those positions paying the biggest salaries and distributing these jobs as "plums" to men in their wards. After dealing with such characters I decided that Sanitary Engineering, such as this, was not for me.

Changes of career

"I packed up and took a train to New York. There I decided, after some checking, that I would learn the dry goods business. I obtained a job in the department store James McCreery & Company. This was an old and fine store in New York, situated on 34th Street near 5th Avenue and directly opposite the old Waldorf Astoria Hotel. Today the Empire State Building stands on the spot where the Waldorf was and McCreery's is out of business. I started to learn the dry goods business from the very bottom; starting in the delivery department of the store where I started work at 5 a.m. each morning. I went through the various departments: adjustment, credit, selling behind the counter, working into the merchandizing end of the business and then into the executive and management end. McCreery's was one of a number of stores making up what was known as the Associated Dry Goods chain of stores. One day I was called to the office of the head of this chain and told to report to the Stewart Dry Goods store in Louisville, Kentucky. This was and still is the largest department store in the city of Louisville and the state of Kentucky. When being sent there I was told that my job was to put it in the black. And that I did.

"From Louisville I went to Dayton, Ohio, and joined the National Cash Register Company. This was in 1916. The following year I enlisted in the regular army and went to France in a trench mortar outfit. I was selected—probably due to my M.I.T. education—to go to the French Cavalry School at Saumur, France. This was and is one of the most famous cavalry schools in the world; having been founded by Napoleon and at one time one of Napoleon's generals (General Ney) was commandant of the School. It proved a most interesting experience. After the armistice I returned to New York from France where I was prevailed upon to return to the National Cash Register Company. In that company I worked my way up from salesman,

sales agent to become Vice President of the Company. Later I became Vice President in charge of all foreign operations (we used to call them Overseas Operations) of N.C.R. in approximately 60 countries scattered throughout the world. I spent much time traveling into the various countries, working with our organizations, and helping to increase our Company profits. I am glad to be able to state that our foreign operations made up a large portion of the total N.C.R. profits. This, of course, was due to the abilities of the fine able men whom I found to surround myself with.

"In 1933 I left that Company and joined an Advertising Agency (Erwin, Wasey & Company, Inc.) which has operations throughout the United States and abroad. In this business I became one of four partners, and today I am the only survivor of the four. As each died or left the business, I bought his interest from his estate and ended up owning the business. In Erwin Wasey I went through many offices: Vice President & Secretary, Vice President and General Manager, President and Chairman and finally Honorary Chairman. My son David graduated from Harvard and after coming out of the Army in World War II, he started in my Company and learned the business from the 'mail room' up. David, the other members of the Erwin Wasey family here and abroad and I built up Erwin Wasey to a fine profitable operation. In 1963 David and I sold our Company to the then largest communications firm in the world. This Company is known as Interpublic and has offices throughout the world with more than 8,300 men and women in its organization. Being a 'down east Yankee' I sold our Company for cash; not wishing to take stock or other forms of payment. When we made this 'deal' it was required that we remain in the business for a minimum of 4 years. This period expired last July 3rd and I severed all relationship with the Company and my son (David) severed his relationship too. So that about runs the skein for the Old Man.

"At present I have my own office with my secretary who has been associated with me for many years to handle my affairs. And I find that I am busier than I used to be. I am in my office usually between 7:30 and 8 o'clock each morning and manage to put in a full day. Jim Killian prevailed upon me last spring to serve another 3 year term on the Development Committee of the Corporation of M.I.T. In addition to that I am a Trustee of Pitzer College, one of the Claremont group at Claremont, California. I never imagined that I would be a Trustee of a Woman's College Board but I find it interesting and rewarding. I also serve on the Boards of several Companies and am as busy as a 'cat on a tin roof' at present. To top off, I have a stable of thoroughbred racing horses, most of whom I have bred and raised. I am 'looking' for a Derby winner before I pass along. Right now I have a filly and three colts out at

Santa Anita, one of the best tracks on the West Coast and probably in this country. These four are in training and seem to be coming along well, to start racing when the season opens at Santa Anita. I have one colt that I have great hopes for. He is by Count Fleet (possibly the best sire this country ever knew) out of a Maposta mare (Maposta was brought over from Ireland and ran some of the fastest races ever run in this country before being retired to the stud). So he has royal blood lines and promises well at the moment. His name is Count Maposta and he is the one I have been working and waiting for. Only time will tell.

Changes of Address

I have two address changes: *Minot S. Dennett*, Room J-2, 2951 Bayshore Drive, Coconut Grove, Fla. 33133; *Morell Mackenzie*, Martin St., Rehoboth, Mass. 02769.

Classmates deceased

A letter from Tonie Campbell, whom all will remember favorably from our fifty year reunion in Harwich Port, told of the death of her husband. Jim died in a hospital October 19. He had been in the hospital four months. A brief story of Jim's life appeared in the March, 1968 class notes. Through the Alumni Association I learned of the death, last October 10 of *Armand H. Peycke*, 2261 Calle Frescota, La Jolla, Calif. He was born in Omaha in 1885, prepared for Tech at the Chicago English High and Manual Training School and Throop College and graduated in Mechanical Engineering.—*Oberlin S. Clark*, Secretary, 50 Leonard Road, North Weymouth, Mass. 02191

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DO YOU REMEMBER the special performance put on for us on Tech Night by Elsie Janis, star of a current musical comedy at the Shubert Theatre? At one point in the show the script called for her to vault a low fence which she did with surprising agility. Our group applauded and continued to call, "Over the fence!" until she stopped the show and repeated that part of the performance.

Jack Lenaerts has contributed the following excellent resume. "After graduation I spent the first 10 years in consulting engineering in the construction business with Stone & Webster and Harry M. Hope Engineering Co., in the design and construction of public utility steam and hydro-electric power plants, substation and transmission lines, as well as in chemical, drug and rubber plants. In 1922, I left to become Engineering Manager with the Hood Rubber Co., and B. F. Goodrich Co., with headquarters in Watertown, Mass. This company manufactured rubber and plastic footwear, rubber tires and rubber sundries. In 1936, I decided to go into the consulting engineering field myself with clients in the electrical, rubber and small firearms

industries. After four years I accepted a position with Talon, Inc., of Meadville, Pa., assuming charge of research, and process and product development in the manufacture of metal and plastic slide fasteners, as well as war supplies and equipment for the Government.

"In 1942, I joined the Union Bag and Paper Corporation, with headquarters in Savannah and New York City, a manufacturer of kraft paper, converting it into paper bags and corrugated paper containers. My position gave me charge of engineering activities, as well as general supervision of converting operations, both at the main plant in Savannah and in branch converting plants throughout the eastern, mid-west and southern states. In this activity I reported directly to the Executive Vice-President in charge of manufacturing. I retired from this organization in 1955 and spent the next two years as a consulting engineer on my own, mostly in the paper conversion industry.

"I retired permanently in 1957 at which time I married my present wife, Marion, after losing my first wife the year before. Both my former wife and Marion went to Waltham High School with me. Since then we have spent our summers on Cape Cod and wintered in Florida, also travelling rather extensively in Europe, Canada and the United States. We have one son in Florida, one daughter in New Jersey and another in Massachusetts. There are 10 grandchildren and two great grandchildren. We are indeed fortunate in being blessed with good health and in being able to enjoy life together and with our large family. The welcome mat is always out throughout the winter months here in Florida for all our classmates and friends."

We talked by phone with *Bill Collins*, one of our loyal classmates who is regularly present at our class reunions. Bill has been in the highway contracting business in Hornell, N.Y., for many years and is still active in this work. He, and his wife Pauline, are in good health. We are expecting a contribution to the class news from him shortly. . . . Our only co-ed, Miss *Hattie D. F. Haub*, Course V., is now 87 and very frail. A note from her niece says she has been living in a convalescent home in Sausalito, Calif., for the past 18 months. . . . *Bill Schmiedeke* advises that he worked 25 years with the Penker Construction Co., Cincinnati, Ohio, becoming Chief Engineer and Vice President. He then moved to Los Angeles in 1950 and spent 17 years with various construction companies as project manager, estimator and field office engineer, retiring in 1967. After 52 years of married life, he lost his wife, Elma, last September. . . . A note from *Jerry Hunsaker* tells its own story, "At age 82 the rocks in the Ausable River, N.Y., seemed as big as pianos, and more slippery. This helps the trout to survive!" . . . More philosophy from *Bill Rhodes*, "Governments, doctors, hospitals, forms to fill out, forms, forms, forms, and dreams of West Indian

cruises, dreams, dreams, dreams; this is the Golden Age?"

Better than ever

Last year we reported a serious leg injury to *Chet Dows*. He reports, "It is about time I brought you up to date. After 18 months my leg is completely healed. A stainless steel plate from hip to knee is doing a fine job. I can do just about everything I could do before the accident. Thank you for your interest. We recently made our annual visit to my folks in Methuen, Mass., where we celebrated our 54th wedding anniversary. We hit the colors in Massachusetts and New Hampshire at their peak. At our summer camp here on the shore of Lake Erie, our fall activity has been to clean up the garden, pulling out corn stalks and the vines of 80 tomato plants, lifting out the roots with a long handled shovel and putting them in a wagon attached to the tractor. Before closing our home for the winter we plan a Thanksgiving dinner for friends at the Punderson State Park, fifty miles from here. There is nothing between us and Canada except the Lake and although our place is heated, the weather is just too rugged for us in winter, so we return to Cleveland. My wife, Frances, and I are both in good health."

Moonlighter

Here is a letter from *Roy Glidden*, "For 45 years I spent an interesting and colorful life in Virginia. I worked 36 years as engineer for the Department of Highways, assuming charge of all engineering, including bridge design, construction and maintenance, for the state primary system, as well as the organization and supervision of the 40,000 miles of secondary road system. I also directed all revenue bond projects, including the great Hampton Roads bridge tunnel project. In my younger days I taught "moonlight" classes at the Virginia Polytechnic Institute and the University of Virginia. The subjects were mainly those given to engineering students such as math, applied mechanics, strength of materials and structures.

"I married soon after graduation and we have one son, Robert, and two grandsons. Robert is Secretary of the International Harvester Company. One married grandson is curate of the Lake Forest, Ill., Episcopal church, and the younger is preparing for his Ph.D. at Princeton. He plans to be a professor. Long interested in the American Society of Civil Engineers, I became president of the Virginia section in 1942-1943 and in the parent society I was an officer from 1946 to 1955, serving as president in 1954-1955, and followed with a two year term as a board member. I was a founder of the Virginia Society of Professional Engineers and initiated work on laws requiring registration for civil engineering practice, one of the first states to enact such legislation. I was also a member of the National Society. My long service in the A.S.C.E. took me about the country, as well as to Canada and Europe. I headed the delegation to

Copenhagen in 1955. Mrs. Glidden accompanied me on this trip, which also included Switzerland, France and England. As a third generation Unitarian, I joined the Richmond congregation and became its treasurer for six years and later its president.

"I had enjoyed good health until a few months before my retirement in 1959, when I suffered a bad case of hypertension. I was forced to give up my piano, which I had always enjoyed, and had to depend on concerts and the symphony orchestras. Two years later we moved here to Geneva, Ill. to be near my son. Then followed two more strokes, in 1966 and 1968. Although these have restricted my activities, I can still get about with a limp and a cane. Our general health is excellent and I hope to be around for a while yet, and to celebrate my 80th birthday in March."

Under suspicion

Arch Eicher writes to tell of his "technique" for acquiring that cherished copy of the *Technique* during the 1911 Rush. (See p. 121, December *Review* for picture and story.) He recalls that Harold Manson, 1910, and Frank Bell, 1910, pitched him up and over the heads of the milling gang, so that he was able to crawl to the greasy window and obtain his copy. Arch is still recording for his grandchildren his experiences in France during World War I, when working on construction with Stone & Webster. Before returning home, he learned that he had been placed on the suspicion list as a possible Heine due to his Boche haircut, his name, and his command of the French language.

Autobiography

Inadvertently, both Jay and I wrote *Henry Babcock* at the same time. This double-barrelled request produced the following "history" from one of our well-known and most active classmates. "All proper autobiographies start with the date and place of birth, and continue with a chronological statement of boyhood experiences, schooling, jobs, accomplishments and disappointments, together with details of family and progeny unto the fourth generation. This one will not follow the norm because I am giving it to you in reverse chronology. At this time I am carrying on a full time professional practice as a consulting engineer, specializing in valuation and real estate consultation. This work includes valuation of business enterprises and urban and industrial real estate, land utilization and project feasibility studies. The first volume of my series of three treatise-textbooks, *Appraisal Principles and Procedures* (Richard D. Irwin, Inc.) was published in June, 1968. Volume II will be completed in 1969.

"From 1946 to 1959, I was a part time lecturer in finance at the University of Southern California, where I developed and taught four courses in property valuation and one on city growth and development. In 1948, I completed four years work on a new type of metropoli-

tan mass transit system, embodying an entirely new concept in the location of stations in the urban community and the pattern of trackage connecting them. Its non-acceptance was a great disappointment.

"During the last half of World War II, I was State Chief of the Division of Man Power Utilization for the War Manpower Commission of Southern California. During the first half, I was Director of Technical Publications for North American Aviation Company. The most important work in this period was the writing of the *B-25 Maintenance Manual*. In 1934, I moved to Los Angeles from Chicago. These were the dark days following the depression, and after I had completed 10 years as a partner of the pioneer real estate valuation firm of Wm. H. Babcock & Sons, real estate valuers and consultants, of Chicago. From 1920 to 1924, I managed a paper pulp mill in Wisconsin. In 1919-1920, I served as Associate Professor of Physics at Northwestern University. From 1917 to 1919, I was in the Air Service, A.E.F. I was one of the 300 "lost cadets" sent to France to learn to become a pilot. After 8 hours of double control and 5 hours solo, all primary training in France was discontinued and I ended up, not a hero, but in the Engine Division, Technical Section, Air Service Headquarters in Paris under Professor Joseph Riley of M.I.T., then a Major and, of all things, writing aviation engine handbooks. In June, 1916, was awarded my Ph.D. in physics, mathematics and chemistry by Northwestern University and was an instructor in physics until I enlisted in the Signal Enlisted Reserve Corps, Flying Cadets, in June 1917.

"In June, 1917, I was married to Ruth Gernon Boltwood of Grand Rapids, Mich. We have five daughters, 12 grandchildren, one great-granddaughter, and one great-whatever 'in escrow.' M.I.T. awarded me an M.S. in mechanical engineering in 1913. I worked under Dr. F. G. Keyes in the A. A. Noyes Laboratory of physical chemistry on Trinity Place, measuring the specific heat of ammonia for my thesis. This was the same problem and in the same laboratory where I worked for my 1912 B.S. in mechanical engineering.

"Up until 1920, I sailed on Lake Michigan as amateur crew on sloops, yawls and two-masted schooners, and for several years participated in the Mackinac Race. My current interests are applied mathematics and the establishment of property valuation, both as a science and as a true learned profession. We spend our summers in Goshen, Mass., where we live in a house which has been in Ruth's family since it was built in 1779. A hearty welcome there awaits any classmates who can come to see us." A most interesting and well written "history", Henry, even though it leaves me a bit twisted around.

At the time of this writing, a few days after Christmas, we have just arrived for

a winter in Bradenton, Fla., where we plan to stay until early in April. A letter or note addressed to Swarthmore, Pa., will reach me promptly, however, and will be very much appreciated.—*Ray E. Wilson*, Secretary, 304 Park Avenue, Swarthmore, Pa. 19081; *Jay H. Pratt*, Assistant Secretary, 937 Fair Oaks Avenue, Oak Park, Ill. 60302

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Due to several bouts with the "Flu" and colds, your Scribe is nearly back to normal. We received a brief note from Mrs. *Ernest Neily* of Aylesford, Nova Scotia, stating that her husband and our classmate Ernest, passed away October 31, 1968. A note of sympathy has been forwarded to the widow asking her for further details. A letter has been received from Mrs. George MacTarnaghan and we quote, "Your kind letter expressing sympathy to my son, Frederick Kington, on the death of my husband is much appreciated. George was born December 3, 1889 and died September 13, 1968. I noticed the account of our good friend, Gordon Taylor, who died last year. He was mentioned as the oldest in the Class of 1913. I believe George was older than he. Thank you. Have a happy Christmas."

Due to the kindness of Warren Glancy, who visited his daughter in Pittsford, N.Y., last fall, a clipping was forwarded which announced the death of our dear friend and classmate, *George A. Richter*, 78. George had a very successful career and was considered an outstanding authority in the pulp and paper industry as well as in research of wood cellulose products. He served in World War I as a Lieutenant Colonel in the Chemical Warfare Service following several years of graduate work at M.I.T. with Professor W. H. Walker. During World War II, George served as an advisor on cellulose and smokeless powder for the War Production Board. Soon after W.W. I, he was associated with the Brown Company, in Berlin, N.H., as director of research and development of wood cellulose products. He joined the Eastman Kodak Company in 1941 as assistant superintendent of the wood cellulose division and in 1947 was promoted to superintendent, a position he retained until he retired in 1956. George, from the time of his retirement until his death, continued his successful efforts in his chosen profession and was associated with many paper and cellulose concerns both in this country as well as internationally. Among his many clients was the Fitchburg Paper Company, Fitchburg, Mass. Its president, George Wallace, was a classmate and a very close friend.

George Richter had some 400 patents in his field and was the author of over 50 scientific articles. In 1957, he was awarded an honorary doctor of science degree by a Swedish university for his outstanding contributions to the field of cellulose chemistry. George held membership in the society of the Pulp and Paper Industry, the American Chemical

Society, the National Defense Research Council, the Institute of Chemical Engineers, the Chemical Club of New York, and the American Legion Post Berlin, N.H. The Class of 1913 extends to George's dear wife, Edith, its most heartfelt sympathy. We shall miss his cheerful letters.

Brief notes

Several notes have been forwarded to your Secretary from the Alumni Office. *Arthur W. Kenney* states, "For color-blind people like me, notices printed in red (e.g. 'Computers in the Service of Society') are practically illegible." *Fred W. Lane* writes, "Hi Phil, It broke my heart to miss the 55 reunion at Falmouth, On May 29th, I broke out with the shingles which meant staying around home for over a month. Hope I can live to attend the next one." *Clarence Brett* notes a new address. "We moved from Teaneck, N.J., in August, to 5445 East Dodge St., Mesa, Ariz. Hope the change will be good for Ruth's arthritis and a chance for both of us to let down. Ruth's daughter and family live in Scottsdale." (We shall miss you two dear friends.) *Wm. Newsome Eichorn* makes a good suggestion and in the early spring we shall endeavor to carry it out. "Dear Phil, How about a year-end dinner for our Boston and nearby class members?"

Several Classmates sent in notes. *R. Charles Thompson* remarks on future reunions, "Luke warm at present." *Joseph H. Cohen* states: "How are you Phil? I'm glad I could contribute to the Lewis Professorship." *Allan G. Waite* replies to the 60th reunion, "Yes," to the 1970 and 1971, "too old." *Clarence Brett* replies to future reunion preference: "Would like to—Date too far ahead and distance too great. Hope all is well with you and yours, Phil. It's a long way East and I don't know when we will make it. But would like nothing better than to attend the next reunion." *Ellis Brewster* replies to the 60th, "At least—Hope." To the interim reunion he says, "I rather think we had best not attempt this." *John Hession* remarks, "Many thanks for the list of Class of 1913 members still living." *Gordon G. Howie* states to 60th question, "Yes, hopefully. We planned to be at the 1968 reunion, but on that day Ethel was on a hospital visit, which turned out to be one of over a month's duration. However she is home again now, although unable to travel around. Hope all is well with you folks." Until next month.—*George Philip Capen*, Secretary-Treasurer, 60 Everett Street, Canton, Mass. 03031

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You will read these notes just about in time to make a trip to the 21st annual M.I.T. Fiesta in Mexico City March 13 to 15, 1969. We are strongly reminded of this by *Homer Calver* who has been a frequent attendant at these affairs. This year the Fiesta will have M.I.T. President and Mrs. Howard W. Johnson as guests.

Ralph Fletcher, '16, on mule-back with a gun and a bottle of "Bud." Photo taken during a Driven Redleg Partridge Shoot in Spain.



The attractions include trips to historic points and other Mexican cities. Registrations should be sent to the M.I.T. Club of Mexico City, Reforma 116-804, Mexico 6, D.F. Mexico. Homer also notes, "Then, too, there are things in Mexico which should not be missed. The great anthropological museum—finest in the world—may sound stuffy but it is most exciting. Nearby is an excellent museum of modern art and on Sunday—usually—the dances, the philharmonic and the opera.

"For the still technically minded there are the many government development programs. And of course there are many fascinating places nearby. Mexico is more foreign than Europe. Prices are going up but still low by United States standards."

Reunion planning

If you indicated an interest in the plans for the 1914 55th reunion, you have already received a detailed exposition of what is expected to take place between June 13 and leading into Alumni Day, June 16, 1969. If you did not receive or act on this information it is not too late.

If you do not attend our reunion it will be hard to say that you cannot afford it because the McCormick Hall quarters will be free as will the dining facilities. Our class treasury still has sufficient funds to meet the bills. Our committee of *Harold Wilkins* and *Leicester Hamilton* have been working diligently. Ham still has contacts at the Institute and can be addressed: Room 4-254 M.I.T., Cambridge 02139.

The reunion high spots are: Friday, June 13, evening cocktails; outside court of McCormick Hall attended by all classes having reunions; Saturday, June 14, a tour of M.I.T. and Cambridge with luncheon at the Faculty Club—7 p.m. Class Banquet, Stratton Building; Sunday, June 15, Dinner at 1 p.m., Anton's Pier on Boston's waterfront or Endicott House. 6:30 p.m., probably buffet supper for all reunion classes in the Stratton Building, with entertainment in Kresge auditorium; Monday, June 16, regular Alumni Day program.—*Herman A. Affel*, Secretary. Rome, Maine. P.O. RFD 2, Oakland, Maine 04963

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As a victim of one of the current respiratory infections (you name it, I've got it) I have been unable to prepare a column this month. But I do call your attention to our annual New York City Class Dinner set up by Larry Landers for Friday, April 18, at the Chemists' Club. I will see you there with the rest of the Boston crowd.—*Azel Mack*, Secretary, 100 Memorial Drive, Cambridge, Mass. 02139

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Let us look back just a bit and start with Calvin Coolidge's "Four Maxims That Made New England Great." Do you remember what they were? Was someone always reminding you of one or more of them? Do you think they are applicable today? Well, here they are: "Eat it up, wear it out; make it do, and do without." Try them out on one of your grandchildren, take care, and let us know what you find. That one about "make it do" is a dilly! Those were the days!

First, *Joe Barker* is anxious include his few words of appreciation and thanks to all those classmates who sent cards and letters to him in late December and early January when he was in the New Rochelle Hospital with a pretty severe case of what turned out to be double pneumonia. In referring back to what *Ralph Fletcher* said in the February issue about the mass of birthday cards he received, Joe says: "Just as Ralph says, the loyalties of our classmates to one another as well as to M.I.T. means a great deal when sickness strikes. What a lift comes to a sick person when classmates and friends send letters and 'Get well' cards—in my case, they were just as important as the medicine!" We are all glad Joe is sure-enough on the mend!

Now back to reporting for that wonderful group we have to work with—over 50 per cent returns on the letters sent out for this month's news! And oodles of Christmas and New Year cards for which we are most appreciative, including some own-made originals by '16

artists to be displayed on the bulletin board at the Reunion next June, specifically by *Irv McDaniel*, *Izzy Richmond*, *Bill Drummey* and *Ed Hanford*. Our earnest, hard-working, young-in-heart president *Ralph Fletcher* repeats his earlier message—save those dates June 13-15, and don't miss the oncoming 53rd reunion at Chatham Bars Inn, Chatham, Cape Cod!

Regional Plan Award presented

In November *Walt Binger* received one of the highest awards that can be given for city planning, the Regional Plan Award of the Regional Plan Association, presented for contributions to the planning and development of the New York Region. Those of us who have been in planning work know the very high significance of this award. This year two awards were given, one to Walt and the seconds to Luther H. Gulick, each of whom has carried large responsibilities in government posts, both Federal and municipal, and especially New York City.

The presentation was made by Harold S. Osborne, '08, past president of the Regional Plan Association, widely known for his contributions to planning in the New York region and in his home town of Montclair, N.J. Here is how he, as a close friend of Walt's for years, presented the award: "Walter David Binger, distinguished consulting engineer, has been a member of our Board since 1949 and of the Executive Committee since 1950. Mr. Binger served New York City in the LaGuardia Administration. Among many other things he built the Franklin Delano Roosevelt Drive with such ingenuity that it runs through the residential fabric of Manhattan's East Side with delight to motorists and without detriment to the homes, schools, hospitals and parks above and beside it. He was influential in having the vehicular connection between the Battery and Brooklyn made a tunnel instead of a bridge, and in preserving Fort Clinton in Battery Park. In his work with Regional Plan Association, Mr. Binger has been the head of transportation committees which, among other things, recommended the establishment of the Department of Traffic of New York City and the formation of what is now the Tri-State Transportation Commission. He has helped to frame policies on parks



Virginia and Joel Connolly, '16, aboard the M.S. Sagafjord.

and open spaces. His interest in this field is also shown by the fact that he is Chairman of the Executive Committee of the National Audubon Society. Mr. Binger, will you kindly come forward. It is with great pleasure that I present to you the Regional Award for 1968." The citation reads as follows: "Regional Plan Award—presented to Walter D. Binger on the occasion of the 23rd Annual Regional Plan Conference at the New York Hilton Hotel on November 19, 1968—Walter D. Binger—Innovator of regional transportation policies and programs; engineer extraordinary who built, and showed others how to build, arterial highways solving regional transportation problems without sacrifice of historical, environment and human values." Warm congratulations, Walt!

Origins

By scouting around and keeping in touch, we often find bits of classmate writings that are, to us, worth wider circulation through the class annals. Here's one we picked up from something *Irv McDaniel* (Cpt., U.S.N. ret'd) wrote to a young man interested in the Navy: "With all the things you have to learn these days, do you have time to find out how rank and insignia originated? We have to go back to the early Greek and Roman days for that. Gold was heavier than silver so it was always found lower in the earth—so a gold bar would be beneath a silver bar; two silver bars are more than one; gold leaf would fall faster than a silver leaf and therefore be beneath it. And looking down from above would be an eagle flying in the light of the stars above. Many of our nautical terms come from the Moors—Admiral is derived from the Moorish word, *Almirante*. Many of our words that start with 'al' are of Moorish origin, such as algebra, alcohol, etc. I think origins are interesting."

Traveling South

Now let us take a little trip toward and then into the South and see what some of our '16ers are doing or saying. As we approach the Washington, D.C. area we have word that *Herb* and *Mary Ellis* are "at last settled" with their "own possessions," in their new Leisure World home in Silver Spring, Md. Am not sure we should say this, but in writing us to

stop by, they said: "Do stop in to see us if you ever happen to be nearby. We love our apartment and we have a guest room (underlined)!" On to Charlottesville, Va., where *George Maverick* continues his correspondence with your assistant secretary on the excitements of wood carving: "My long-delayed big Spanish chest is still not in progress. Dallying over the design, though the first blow should be struck soon. After that I hope I'll go like mad." George mentions that, since Ruth's hospital visit, they are "simply quarantined on the farm. Right good way to be situated in view of the flu. Doctor says 'no visitors' and you can't imagine how restful it is. But it begins to get boring."

Next we come to *Clint* and *Phyllis Carpenter* in Virginia Beach, Va.; Clint says his traveling for the past year has been limited to a few trips to the hospital: "Fortunately they were round trips and although that did not result in reduced rates it wasn't so bad." As Clint wrote, the dominant interest was Christmas, "although challenged to some degree by the moon flight. Both daughter and son are living here at the Beach and Phyllis and I are looking forward to having them all here with us for Christmas dinner and all the things that are a traditional part of the true spirit of Christmas. There will be Sylvia and husband Dick (Forsberg), Jerry and wife Nancy, granddaughter Courtenay (6) and grandson Clinton II (2½)."

And now to Winston-Salem to hear from Arvin and Claire Page. Arvin says in typical fashion that he has delayed answering our earlier letter for two reasons, "First, my natural talent for procrastination, and second, the vain hope that something of a newsworthy nature would occur." He notes: "My activities are confined to a daily (in good weather) walk of a mile or so and riding a rocking chair while I read or solve a crossword puzzle. During the past 12 months I have ventured out of town just twice, once for a couple of days at Pinehurst and once to Roaring Gap. The latter is a summer colony located on the Blue Ridge about 55 miles from here at an elevation of something over 3,000 feet, a beautiful spot." Speaking of North Carolina, back in December we

had a card from *Rudi Gruber* in Hendersonville, showing Looking Glass Rock, Pisgah National Trust, near Brevard. Rudi was "Visiting family over Christmas and New Years, enjoying the lovely surrounding mountains and forest."

First in Florida we meet *Coke Flannagan* in Inverness, who tells us that 1968 brought two surprises—both female! He says that son John's wife "presented us with a granddaughter in August, a surprise because their only other child was eleven. The other surprise was Hurricane Gladys which passed directly over us in October leaving considerable property damage which we will remember for some time as there remains much clean-up work to be done on this 12 acre plot of ours." Palm Beach is where *Jap* and *Hildegard Carr* are located—in fact have been located for the winter months for many years past. Jap tells of his vigorous trip north late last spring, followed by the drive to the Reunion on the Cape, a visit to M.I.T., then back down to Provincetown to see Hildegard's painting teacher. It all proved to be a little too much for him and as a result there was a hospital trip followed by no tennis for a while. However, in December he writes, "I am much better and got an O.K. this week for 'easy' tennis and played 20 minutes today. Hopefully a half hour next week (three days a week). Since arriving in Palm Beach I've been on a swimming re-conditioning program and have progressed from 200 feet daily to 300 yards daily and feeling much better." He also reports: "We have a happy event! Our son and his wife have an eleven-week-old grandson for us so it will be a very happy Christmas for them and for us."

Then: "We've been going to a lot of football games on Everglades Club bus trips to Miami. Still to come are the Orange Bowl game (Penn State), the Pro Bowl game January 5, and the Super Bowl game January 12. Happy 1969 to all." Now to Delray Beach just south of Palm Beach, where we find *Cy* and *Gyps Guething* by mid-December. Cy had written in early December that the first frost had made them impatient to get down to warmer climes, and particularly, for him, "a dip in the salt water each morning before breakfast." December 17

found them at The Seagate, and Cy's first message read like this: "Chickened out this morning in the salt water pool as the temperature of the air here was 34—an all-time December low. Sorry we left Birmingham so soon. We hope to build ourselves up so that we can be on the Cape next June."

Frank Ross reports that on February 1, the Ross address will change to 3400 Gulf Shore Blvd. N., Naples, Fla., 55940. Says: "We moved to Florida last October and have given up our Connecticut residence permanently. We may spend a couple of the summer month in the mountains of North Carolina if it gets too hot here. We'll have to wait and see." Also, please note, Frank, the temperature and the people are still pretty nice as summer starts in Chatham, Cape Cod. Hope you can make it this June. Not an order, Frank, just a suggestion—we are not your freshman corporal now!

From Bill and Helen Leach in Austin, Texas we have word, and hear Bill say "I still keep busy which is the best way." They indicated they expected to drive to Florida in early February and sail on the 20th from Port Everglades for the Caribbean. They hope to be at the 53rd reunion in June.

Collectively, your secretaries have been enjoying the Round South America cruise being taken by Joel and Virginia Connolly since early November for they have kept us informed point by point along the way. From the postmarks we see they are aboard the *M/S Sagafjord*. The first intelligence was dated November 8 with the message: "We had a most interesting visit to the Inca ruins at Machupicchu yesterday and to Cuzco and Lima." Next from Punta Arenas "the world's most southerly city" came the November 24 message: "We are in the Strait of Magellan where the sub-antarctic scenery is sublime, with snow-capped peaks and glaciers all around us and perfect weather for seeing it." Then in mid-December, off the coast of St. Thomas, Joel notes that since writing last, he and Virginia have found that our olden-days "classmate" Dean Thorndike Saville, '17, and his wife are on the same Round South America cruise and that they had had several pleasant visits together. Before retirement, Thorndike was Dean of the College of Engineering, New York University in New York City.

Through Jim Evans whose contact pen keeps busy, we hear that the curling season started up back in November—something that is going to keep Henry Shepard "busy for the rest of the winter." Also that Jack Camp had contacted Miguel Marquez, had "Had a nice answer in which he said he would advise me the next time he comes up (to Mexico City, that is), so we can try to get Gonzalo Garita to have lunch with us—we three are all the '16ers in Mexico."

We have two correspondents this winter up in the Great Lakes region. Eric Schabacker of Erie, Pa., passes along the

opinion; "That's a mighty fine crowd in fine spirits in the 1968 reunion picture." He says further: "In late October we finished our 1968 visits to our 'three out of Erie families with a plane trip to Denver. Saw Ray and Melva Brown in their new apartment overlooking Niagara Falls. They are both fine and we planned to see each other again before now. A short stay in the hospital for minor repairs has interfered and I got out yesterday (December 5)—feeling fine."

And we have details of Ted and Allie Jewett's 50th wedding anniversary celebration in Buffalo last June. Their three children plus husband and wives (in-laws) gave them "a beautiful party at the Gavel Club here. All our grandchildren were there plus Allie's three sisters-in-law and two brothers, who came on to celebrate. The party was also given by the three Gurney children for their mother and father, the William Gurneys, great friends of ours. The Club was decorated with life size posters of pictures taken during our various ages. The children wrote a beautiful song giving the history of our 50 years and the Gurneys. All very gay and such fun. We hope to go to the Hillsboro Club at Pompano Beach for six weeks at the end of January." Speaking of going to Florida, that's what our neighbors, Elsa and Ed Mueser of Mountain Lakes, N.J., plan to do on the first of February: "To Naples, as there will be no leaves to rake, no grass to cut." Elsa mentions that they went to Maine in November, "driving in snow, sleet, rain and fog, and will fly hereafter." We surely understand!

Pictures welcome

J. Spotts McDowell—that was a name we used to hear in our A.S.T.M. quality control work way back in the '30's, a different name, a name that somehow you never forgot. And it was not until some years later that we found out that the well-known J. Spotts, the writer of the book *Modern Refractory Practice* (four editions), used by colleges and universities, was a classmate of ours. Now retired, he lives in the Webster Hall Hotel in Pittsburgh. An old reliable, when it comes to answering requests for a paragraph or two, he has started what we hope might become a new custom among '16ers, by sending us two excellent small colored photos of himself, that we will duly mount on the bulletin board at the 53rd Reunion in June. If you have a spare photo of yourself, please send it along to one of your secretaries—we would like to build an up-to-date collection of such prints of '16ers.

Back to New England we have a number of interesting personal items. Hovey Freeman in Bristol, R.I., who retired from active business in 1964, and from the presidency of the second-largest hospital in Providence, still holds directorships in various companies. He and his wife also gave up their house in Providence that they had occupied for over 50 years and are now living in what had been their summer home at the end of Poppasquash

Point (see your R.I. roadmap for this prized location). As Hovey says: "A wonderful location with an excellent view of the Bay and the boating and shipping activities. Providence is a large oil port and tankers pass frequently." Hovey has had a rough time with a couple of operations that kept him in the hospital, but says he is now almost fully recovered—"am on a restricted diet and no alcohol; have lost 120 pounds so some of my old friends don't recognize me." He spends time reading, watching colored TV and working in his hobby shop. Says: "The tribe continues to increase, now three great grandchildren and 21 grandchildren. All well and happy."

In December, Earl Townsend of Newtonville mentioned that he had just had the opportunity to exchange greetings with classmate Henry Shepard. When asked if he were still the great traveler, Earl noted: "After seeing all 48 states and most of the Canadian provinces plus Puerto Rico during my working years, I have little urge to get on a train or boat. Family count: four children, six grandchildren two of whom are in college and one married, also two great grandchildren." Allen Giles is again getting back into the mainstream of living, "carrying on" as he puts it, since his wife died last May. Fully retired in 1966, he and his wife had had "a marvelous time" doing the many things that they had deferred during the working years, and he now expresses his gratefulness that they had had over 50 years together.

Tom McSweeney makes it easy for us to report for we can give it in his own words: "You know I am a sucker for your do-it-yourself methods. Here's another example of how they react on me: What I've been doing? Been working busily at my job. Not as busily as I used to, but enough to answer my requirements, and as you may imagine, these change with the years. Where have I been? Fortunately for me, my work takes me around a great deal, and Margaret and I do quite a bit of extra-curricular traveling. Last summer we took a summer course in University College in Dublin and had a wonderful time. As for grandchildren, they continue to grow up. Our oldest granddaughter is graduating this month from B.U. Doesn't seem possible but it's true. And as for Philosophy—the mental meanderings of an aging engineer would be quite incomprehensible even to other aging engineers. I'll skip this item, but the best of everything to all of you."

Something different

You can bank on Maury Holland for—what shall we say—doing something different. Well here he is, at it again, this time on the home stretch of a two year professional writing course at "Famous Writers School," Westport, Conn. Apparently when the field representative found that Maury had published seven books and over 200 articles, they asked the obvious: why was he taking a course in writing! So once he got started, the subject he chose for his first assignment

(what we used to call a "theme") was—guess once, guess twice, and you'll be right—"Why I Am Studying Writing." Are you interested in his first paragraph and what teacher said? Maury lets us quote: "Three quarters of a century is a lot of living in anyone's mortality table. Especially since the later 30 years were spent traveling around the world. The accumulated experiences have provided me with an impressive stockpile of interesting, colorful, and sometimes dramatic stories. I would like to share with others my impressions on these journeys through thirty-odd countries in Europe, South America, the Far East and Scandinavia. None of these odysseys were undertaken for pleasure." The instructor's comment here (good for an A, no doubt) was: "Good direct start; catches interest quickly." Maury has completed 18 assignments in two years, is very enthusiastic, and thinks the subject "may have wide appeal for any classmates who have a yen to write." If you want more information, just write Maury at 436 Love Lane, E. Greenwich, R.I. 02816.

Again we come to the close of the column. Letters to be reported next month include those from *Paul Page Austin* of San Francisco, *Duncan Oowler* of Fall River, *Dave Patten* from So. Duxbury; plus a beautiful description of the uttermost north of Cape Breton Island by *Victor Dunbar* of Hanover, N.H. and Cape North, Nova Scotia; and some of the inner elements of *George Petit* system of predicting probable beginnings of major rallies and slumps during a baseball season. Don't forget the June 13-15 dates for the 53rd reunion in Chatham, Cape Cod. And keep up the good work—continue to write a little but write often to your delighted-to-be-hard-working secretaries, and full best wishes for 1969.—*Harold F. Dodge*, Secretary, 96 Briarcliff Road, Mountain Lakes, N.J. 07046; *Leonard Stone*, Assistant Secretary, 34-16 85th street, Jackson Heights, N.Y. 11372

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Our illustrious artist, *Nelson Chase* of the Rogers Building painting (see p. 84, February issue), has just completed two large murals for the Aesculapian Room of the Harvard Club of Boston. He found the research work to determine suitable subjects most interesting. Naturally, there had to be a medical background and he began with pre-revolution material. Four portraits of famed doctors of the time, "The Burning of Charlestown," and the "Battle of Bunker Hill" are depicted. These panels, the other two in that room, and the six large paintings hanging in the club's dining room, all by Nelson, should not be missed if you have an occasion to visit the club.

Classmates deceased

The long-time secretary of the Class of '15, *Azel Mack*, advised of the passing of *Jay J. Sindler*, of 115 Center St. Mal-

den, Mass. Quoting from the 30th Anniversary Report, "At Bethlehem Steel Co., Baltimore, January 1, 1917 to May 1, 1917. In Chemical Warfare U.S.A., September to April, 1919. Development and installation of charcoal system of solvent recovery at Framingham, Mass., 1920 to 1925, (one of the first in the U.S.). Technical Superintendent, Hodgman Rubber Co., Framingham, 1925 to 1932; Technical Superintendent, Converse Rubber Company, Malden 1932 to 1942. Started Spir-it, Inc., Malden in 1934 to market my invention of a wood cocktail stick. The business developed rapidly to include plastic stirrers and spoons. At present Spir-it, Inc., supplies 95 per cent or more of such articles used. If being free to do what I want can be classed as a hobby, that's it."

Thanks to *Win Swain* we are advised by a newspaper clipping of the passing of Captain *Gerald V. Thomson*, U.S.N. retired, December 29, 1968, in his 76th year. He resided at 222 Prospect St., Hingham, Mass. "Husband of the late Alice C. (Holt). Father of Mrs. Penelope T. McCulloch of Hingham, brother of Miss Ethel Thomson of Lynn. In lieu of flower donations, donations in his memory were made to the Home of Little Wanderers, 161 South Huntington Ave., Boston." Quoting from the 30th Anniversary Report, "Spent 27 years working for the Navy Department, principally in the Construction Corps. Among my later duties were Hull Superintendent, Pearl Harbor. Another particularly interesting duty was organizing the Navy Office as Supervisor of Shipbuilding at Ingalls in Mississippi. My last duty was Hull Superintendent of the Field Production Division of the Navy Yard, N.Y. This office was concerned with the conversion work and handled most of the Navy end of this work done by the private shipyards in this area. Have made "doing-over" of old houses a hobby. After the purchase of a 1776 dairy farm in Hingham, had a lot of fun installing glass wool insulation, modern lighting, heating and plumbing and a lot of miscellaneous work. This included "doing-over" the main house, the dairy, and finally the 25 foot diameter silo into living quarters."

In brief

"Time Marches On" [from Monsanto Company News Bulletin] *Monsanto Observes 25th Anniversary in Atomic Energy Work*: "In October 1943 the director of the Research Dept. was called to Washington, D.C. with Gen. Leslie Groves and Dr. James Conant. Gen Groves was head of the Manhattan Project."

William A. Sullivan, retired Rear Admiral, retains his New Jersey address, however otherwise he has forsaken the state. "Sully is endeavoring to pay the rent out in Las Vegas—same as last year. Daniels '16 has the same talent, as noted in Class notes as Sully, the big difference is that Daniels plays the piano."

J. Raymond Ramsey and wife had a delightful thirty-day flight tour of South America in connection with the Wittenberg University (Springfield, Ohio) Choir. They visited all of the major countries, except Bolivia.

Professor *Hubert W. Collins* and wife last summer spent three months in Europe and North Africa visiting a few of the old familiar places where he had spent some three-and-one-half years during World Wars I and II. He also discovered new areas of interest in countries that were inaccessible during former tours of duty.

Tharratt G. Best, of 201 Main St., Boonsville, N.Y. says: "Just passed my 76th, but am still plugging—Bank Committeeman, Land surveyor, and trusteehip of six estates; off to South Africa this winter; still remember that glorious 50th."

Cornelius C. Coakley of 4406 Wakefield Road, Richmond, Va., "We celebrated our 50th wedding anniversary by a glorious trip to Glacier National Park, Banff Lake Louise, and Jasper Park. Our daughter and family were touring the U.S. in a trailer and crossed our path at Glacier National Park."

Earl C. Lewis, 18 Reservoir Drive, Danvers, Mass., "Still serving as consultant at Raytheon Company, Andover, planning new office building." He vacationed in Spain last fall.

Walter C. Wood, "My work with juniors at the San Diego Yacht Club keeps me young and active and we are enjoying the sunny days and gorgeous blue bay, but Cambridge and M.I.T. and old friends can't be replaced and we miss them all deeply." Jack's address is 3560, Talbot St., San Diego Calif. 92106.

Warren L. Tapley, as of September 24 1968, "Last month my wife fell over one of those numerous cartons they leave around on the floor in the super markets—result broken hip. I have been and am now, nurse, buyer, cook, cleaner, bed maker, etc. I'd love a vacation." Here's hoping ere now all is well including that hoped for vacation.

Carle Adams, as of May, 1968, "Still continuing on my old job, at what used to be, Fruit of the Loom, but hope to retire this year. I think of the old days up to and including 1917 very often, and am sorrowful over those who have passed over into the Great Beyond."

Thomas W. Ryan, 114 North Elizabeth St., Ferguson, Mo., "I am still hobbling around on a crutch following the repair of arthritic hip with stainless steel joint. Doctor says I will be out dancing in a few months. My lovely wife says, with whom?" As this was prior to the 51st reunion, we hope Tom that you are now out dancing.

Howard Melvin regretted that he is too far away for yearly trips east as he

more than enjoyed our 50th reunion. Let us see you at the 55th.

The *Review* procedure as of now—The *Review* is sent to all members of a Class out 50 years or more, whether they contribute to the Alumni Fund or not. If one of these men dies, who was a Fund contributor, the *Review* continues for the rest of that year. If he was not a contributor, the *Review* sending stops. If a widow subscribes for the *Review* at \$7.00 per year, or continues to contribute to the Alumni Fund, she receives the *Review*. The Alumni Fund does not solicit the widows, the fact is that there is no complete widow record file. The *Review* will be sent on request.

The monthly January luncheon at the Chemists' Club in New York was much too exclusive as attended only by Lenard Stone, '16, Dick Loengard and Dix Proctor. However, the two-and-one-half hours was most interesting and the food superb.—C. Dix Proctor, Secretary, P.O. Box 336, Lincoln Park, N.J. 07035; Stanley C. Dunning, Assistant Secretary, 6 Jason Street, Arlington, Mass. 02174

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As I contemplate the scene, being a native Bostonian, mayhap there is some justification in describing some of the physical changes here since 1914-1918. Walker and Rogers building are gone, in their stead you see the new New England Life Insurance Company building and tower. Engineering A, B, and C are no longer here. On this land is the former University Club edifice recently purchased by the John Hancock Mutual Insurance Company. Irvington Armory (where we picked up splinters while we did our calisthenics) was razed; it is now part of the clover leaf of roads leading into the Massachusetts Turnpike. Copley Square is being converted from a triangle to a quadrangle—Trinity Church, Old South Church, these landmarks remain practically unchanged.

The Brunswick and MacLochlan's no longer exist; the Copley Plaza has been refurbished and is now the Sheraton Plaza. Our dinky uniforms, "so dapper and so neat," handed down with hard bargaining from class to class are gone. Another institution of our undergraduate days is in danger of disappearing from the scene—the Field Day traditional between Sophomores and Freshmen.

Somehow these things which were the Tech on Boylston Street remain more indelibly in my memory than the new M.I.T. across the Charles River. Is it because we were younger then, and more impressionable, or is it because we were so crowded in those then aged buildings that we got to know each other better? Or did we feel we were rubbing elbows with the great men who preceded us like Arthur D. Little, Edwin S. Webster, and the others too numerous to mention, and who made

these halls, however inadequate, mellow? Am I a lone wolf in these thoughts? I will be interested in comments from fellow eighteenthers.

And now I continue in our news and reviews of classmates, to bring you to date on our genial and devoted class agent, Julie Howe. Born in Scituate, Mass., and a graduate of Andover, he selected Course XV as his major. In his senior year he was President of Corporation XV, and Chairman of the Finance Committee of the Institute Committee. He was treasurer of Junior Prom, a member of M.I.T. Glee Club and Tech Show Orchestra, and played on the class football team.

Like most of us, he joined the U.S. Army in his senior year, and received his commission as an officer on the eve of the armistice. Soon after becoming a civilian, he became an executive of the Boston Garter Company. Buffeted by the depression made for employment changes. He emerged as the financial manager of the town-owned public utility department of Wellesley, Mass., a position he held until his retirement about five years ago. Julie served on many town committees and has given much time to his church as its treasurer.

His hobbies are many and varied, including baseball, skiing, sailing, gardening, and playing the violin in a small orchestra. He and his wife are devoted to their two children and grandchildren. A grandson returned only this Christmas from Vietnam. What a joy!

In 1926, his dream house, built in Wellesley, was the first one designed by Bill Willis in that town and was responsible for a still closer tie between two 1918 classmates. Incidentally, there is a large number of Royal Barry Willis-designed homes in that part of suburban Boston. Retirement brought a new hobby, travel. Julie and his Elizabeth (a charmer if we ever met one) spent a year in Europe, visiting fifteen countries. Their notes and pictures, representing much research and perceptive observation, should be published.

A visit

In Norway the Howes visited classmate Rolph Knudson and his wife Ingeborg at Borgstad, 100 miles south of Oslo. Some of you may recall that Rolph's father was Prime Minister of Norway when he was a student at M.I.T. On his return he entered his family's business—the manufacture of many kinds of tile—an industry started by his grandfather. During World War II, a German officer appeared at their house one evening with orders to requisition their home by 7.00 a.m. the next morning. The Knudsons and their friends emptied their domicile during the night and moved into the family's factory for the duration. They now live back in the ancestral estate where Rolph spent his childhood. The Howes treasure the visits to their home with its brocaded walls, glittering chandeliers, and royal portraits. With

all the elegance, it was a working farm with extensive fields and buildings. The Knudson family is known for its good works in Bargstad; a bronze statue of Rolph's father has been erected in the square and Rolph carries on the tradition of service to his community.

Just today, by way of coincidence, came a note from Julian Avery, "Jean and I had a fine visit with Rolph and Ingeborg Knudson in October. Rolph drove us across Norway and back over tricky mountain roads with all the aplomb of a professional. They are both well and very sorry not to have been with us for the 50th reunion."

More travelers

The following is a very happy and interesting greeting from Granny Smith, 606 Canal Road, Siesta Key, Sarasota, Fla. "Merry Christmas to you all. . . . Although we did not go abroad this year, we travelled almost as far by plane and car. In May we flew west to San Antonio to visit G's brother and family for a week and to see the Hemisfair with exhibits from all parts of the world. G's sister came south from Missouri to make a real family reunion. One of the highlights of our stay was a leisurely drift down the San Antonio River on a barge through the city and past the edge of the Fair—meanwhile being dined and wined in true Texas style.

"After returning home to repack, we were off again by car on June 1st to G's TWO 50th reunions in Cambridge, Massachusetts; first M.I.T. and then Harvard. At a never-to-be forgotten weekend at the famous Wianno Club on Cape Cod, the M.I.T. '18ers golfed, swam and danced till the wee small hours to an orchestra flown in for the occasion by a generous classmate. The class was honored to hear its most distinguished member, Bill Foster, tell of his talks with the Russians at Geneva on the non-proliferation of nuclear arms. Then back to Cambridge for M.I.T. Alumni Day and the start of the Harvard reunion. We were again housed in an attractive dormitory, and banqueted and entertained to the point of exhaustion.

"We recovered in our cottage on the shore of Lake Androscoggin at Wayne, Maine, to be near D's relatives and to attend the wedding of an especially beautiful bride. It was all that a wedding should be and even the sun co-operated by coming out of hiding after ten days of rain. My son, Roger, got away from his duties with Pratt & Whitney long enough to pay us a visit there, and we sent his daughter, Randy, to T-Ledge Camp on Orrs Island for a month. Later, we visited Roger and Anne and the rest of the grand-children in South Windsor, Conn.

"Our two-week trip to the Province of Quebec seemed like a visit to foreign soil where French was the only language spoken; even the TV was French. We did discover an English couple at the

charming inn, Les Trois Canards, on Murray Bay where we spent a week. Not far away the Saguenay River flows into the St. Lawrence and the mountains come right down to the water's edge. The scenery was spectacular.

"We had wonderful visits with friends in New London N.H.; East Northfield, Mass.; Syracuse and Geneva, N.Y.; and a whole week in Morristown, N.J.—an easy bus ride from New York City, our home base. After a short stay in Chevy Chase outside Washington, we continued south to Mt. Pisgah Inn on the Blue Ridge Parkway with its fine vista of the mountains. Finally, our usual week at High Hampton Inn, Cashiers, N.C., where G. swam and played golf at 3800 feet above sea level.

"Home again September 11 and immersed in many activities—G. as head of the Disabled Officers Association and historian of the Military Order of World Wars, working at the Players box office ("Roberta"—the latest attraction) and D. aiding in the exhibit and sale of paintings by mental patients of Arcadia, doing psychological evaluations for the State Office of Vocational Rehabilitation, remedial reading at Migrants' Camp for A.A.U.W., working for the board of Family Services Association, etc. Both, of course, enjoying many activities together such as the Players, West Coast Symphony concerts, not to mention exploring the many waterways by boat, and just enjoying the good life here in Sarasota. . . . And a Happy New Year too! Dorothy and Granville Smith

Involuntary change of address

Another interesting letter was received only today from Jack Kennard (806 Morris Turnpike, Short Hills, New Jersey 07078) and it follows. "Dear Max: Am writing mainly to acquaint you with our change of address, which was not a voluntary affair on our part. On our way back north from a brief stay in Florida, last September, we were looking forward to a visit with the Longleys' who had as their guests the Walter Robertsons. We also expected to see the Poteats—a small reunion of our own. We stopped off at Tryon, en route, to see some non-Tech friends, who gave us the bad news that our apartment at 1 Euclid Ave. had just been destroyed by fire. We hastened back to Summit without seeing our classmates and found that while our apartment had escaped fire damage, all our furniture was ruined by water and would need re-finishing (which has not yet been completed) So since then, we have lived from hand to mouth, finally getting in a Short Hills apartment December 1. All this was particularly annoying since we had sold our home and moved into the Euclid Avenue apartment only a year ago.

"As I said, this is not intended as news, since it is of no interest to anyone but the Kennards. It does, however explain our change of address—shall appreciate it if you will pass the new one on to the Tech Review.

"I congratulate the Class, if not you, on your assumption of the Secretarial portfolio—you have made a fine start! Our best to you and your good wife. Sincerely, Jack Kennard"

We are happy to note that Ted Wright has been made an Honorary Fellow of the American Institute of Aeronautics and Astronautics, congratulations and our best to you.

Classmate deceased

We note with sadness the death of Norman Dawson as reported in the local Needham Chronicle. "Word was received in Needham recently of the death, Nov. 1 in Elmhurst, Ill. of Norman Dawson, son of Mrs. Clara Turner Dawson of 326 Webster Street, Needham Heights. He was a former resident of Needham Heights. He was 72 and until his retirement in 1963 was an engineer with the Chicago sanitary district. He was educated in Needham public schools and a graduate of Massachusetts Institute of Technology in 1921 (as of the class of 1918). His education was interrupted during World War I when he served with the U.S. Army Field Artillery.

"Besides his mother, he leaves two sisters, the Misses Ruth and Mabel Dawson, both of Baltimore, and a son, Norman Dawson Jr. of Bethlehem Pa., and three grandchildren.

Changes of address

In addition to the change of address noted above, I record two more: Professor Charles E. Stratton, 23 Glenwood Road, Upper Montclair, N.J. 07043; Charles F. Simpson, 2909 Barcelona St., Tampa, Fla. 33609.

I am happy to acknowledge season's greetings from so many of you—it is one of the pleasant dividends of this job.—Max Seltzer, Secretary, 87 Ivy Street, Brookline, Mass. 02146

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Mashall Balfour and his wife plan to be at reunion. For the first time in many years Bal has not been abroad, but he is still a consultant in population work. He and his wife keep busy at their place in South Kent, working in the yard and garden, and in the summer entertaining children and grandchildren.

George and Cecily McCarten went to Detroit for Xmas where two daughters and seven grandchildren live. Their Xmas card was a pen and ink sketch by Cecily of a covered bridge in Lancaster where they live. George says he enjoys four seasons and the snow is beautiful.

We regret to report the death of Raymond C. Baldes in Boston on August 7, 1968.

You have all received a letter from Will Langille about the reunion, and the list of those who are planning to attend. Hope twice as many names will be on that list when this issue of the Review

reaches you. Be sure to send your reservation for rooms at the Chatham Bars Inn for nights of June 13 and 14.

A pre-reunion dinner was held in Boston on December 6 for '19ers living in the vicinity. Those attending were: Frederick C. Spooner, George Michelson, Dean K. Webster, Maurice E. Goodridge, Royden L. Burbank, Ed Moody, Paul D. Sheeline and Ken Brock (of the Alumni Fund). Don Way came up from New York. A New York meeting is scheduled at the Roger Smith on Tuesday, January 14—Eugene R. Smoley, Secretary, 1111 Casuarina Road, Delray Beach, Fla. 33444

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It warmed your secretary's ancient heart to receive Christmas greetings from Betty and Norrie Abbott, Mary and Buck Clark, Billie and Dick Gee, Ilsa and Chuck Reed, Dottie and Stan Reynolds and Pat and Buzz Burroughs. As has happened for many a year, we celebrated New Year's with the Clarks but this time stayed at Grafton Tavern in Grafton, Vt., a delightful inn in a charming country village. Chuck Reed added a note to say that he had done less than the usual amount of traveling last year although Ilsa had made one of her many trips to Vienna while he paid a visit to the Ha' Penny Beach Club in St. Croix, Virgin Islands, of which he is a founding member.

Stan Reynolds answers my request for further information about his rugged Alaskan safari by reporting that he and Dottie had indeed survived the trip to the wilds of the Yukon and actually drove about 150 miles beyond Whitehorse on the Klondike Highway which is about half way to Dawson City before they transferred to a Land Rover. After two weeks in the wilderness, this intrepid pair continued on to Dawson City and from there to Anchorage before turning homeward. We are filled with admiration for their gumption and enterprise. While we are at it, we take a deep bow to Lucy and Jim Gibson who set sail from New Orleans on the freighter "Oriental Musician" for a long and leisurely trip to the orient. A salute to the Commodore of the South Brooksville, Bucks Harbor, yacht club.

Carleton Alexander writes, "Hope that I can make it to the 50th reunion. I'll certainly try to be there. I am happy in my retirement situation and appreciate being able to spend a lot of time with the family and to pursue my old hobby of ham radio. (Al Burke, please note). My last station was K7BBM, Shungnak, Alaska, in the early 30's and I am now trying to catch up with the state of the art." Carleton's address is 1408 E. 300 St., Wickliffe, Ohio.

Since we last saw Bob Tirrell of Englewood, N.J., he has devoted much of his life to Mrs. Tirrell who has been an invalid for many years. Bob hopes that

she may be able to obtain some of the new medication that promises relief. We certainly hope so, Bob, and would appreciate your keeping us informed.

Three generations at M.I.T.

Congratulations are in order for *Irving Wilson* of 538 Lowell St., Lynnfield Center, Mass. who is able to make the proud boast of three generations of Wilsons attending M.I.T. His son Robert E. Wilson, '45, of Bala Cynwyd, Pa., has been advised that Irving's grandson David, has been accepted for entrance in September of this year.

A welcome letter at year's end from *Art Merriman* of 2314 Lamberton Road, Cleveland Heights, Ohio, says that the new address on Cape Cod, mentioned in the December notes, is of a brand new home of Cape Cod design which his son built for him and Mrs. Merriman recently. Art's early activities were with General Electric, then Atwater Kent Radio and then Hickok Electrical Instrument Co. In the early thirties his doctor recommended a change to more outdoor activity so Art made a complete switch to real estate in Cleveland Heights and Shaker Heights. Art mentions that

Archie Kinghorn, as previously reported, moved to 2634 Virginia St., Berkeley, Calif., from St. Petersburg, Fla., and that *Tom Orchard* retired from Cleveland Heights and now lives at 73 Sea View Drive in Providence, R.I. Art sends "Best wishes for all the Class, both during 1969 and the future."

A nice letter from *Henry Massey*, writing from Forest Beach, South Chatham, Mass., says that he and his wife are presently domiciled in the Cape Cod Village Apartments on Main St., Harwich, the above address being their summer cottage on the shore which they intended to winterize but "try and get anybody to work at a reasonable price these days." Henry says it seems good to be coming home to New England and out of the N.Y. area. He was born in Brookline but spent some 25 summers on the Cape with his two boys and one girl.

Now, alas, says Henry, all three reside in California, Captain A. W. Massey, U.S.M.C., of El Toro, Henry P. Massey,

Jr., formerly Lt., U.S.N., and now a lawyer in San Francisco, and Anne Massey Schmidt, wife of Lt. Schmidt, Navy dentist of Oxnard, Calif. If you write Henry use South Chatham post-office box 191 and you'll be sure to reach him.

Frank Badger notifies us that he is no longer at 1500 or 1510 North Ocean Drive, Hollywood, Fla., having sold most of his "Ocean Mist" motel. However he has retained the south building for living quarters and the number is 1418 same address. Keep well, Frank and Winnie, and may you have a long and happy life.

Active alumni

The newly reorganized Alumni Advisory Council includes *Al Glassett*, *Ed Ryer* and your secretary as past presidents of the Alumni Association, *Lee Thomas* as reunion gift chairman, *Al Burke* and *Perk Bugbee* as class agents and *Pete Lavedan* as class estate secretary, a goodly representation on the esteemed Council. Others noted in the new Directory of Alumni Officers are *Fran Badger*, alumni fund regional chairman for Ft. Lauderdale, *Archie Cochran*, of the Corporation Development Committee and *Fred Fischer* also on the Corporation Development Committee. *Archie* still resides in Louisville, Ky., and *Fred* is in Kalamazoo, Michigan.

Medwin Matthews has been located at 79 High Plain Rd., Andover, Mass. and *Elmer Grismer* at Apt. 6, 3217 Golden Rain Road, Walnut Creek, California.

Classmates deceased

Now for some sad news. *Marion Sanders* the squire of Wytheville Va., passed away early last year. He was a loyal and interested classmate and the Class mourns his death.

Genial, friendly *Adolph "Dode" Spiehler* of Wilmette, Ill., died last fall. All who knew him, he was a transfer from University of Rochester, remember him with affection and shall feel his loss keenly.

Winfred Wilde of Brattleboro, Vt., died recently. He was a graduate of Course XV. No details.

Charles Wesley Eaton of Cohasset, who transferred from Dartmouth College and later left to join the army air service, died last July. He was a partner of *Shields and Co.*, having spent his entire career in the investment field.—*Harold Bugbee*, 21 Everell Road, Winchester, Mass. 01890

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Viva Mexico! The '21 contingent is just about to take off for our third interim in Mexico in conjunction with the 21st annual Fiesta on March 13 through 15 of the friendly members of the M.I.T. Club of Mexico City and their gracious wives. As you read this, some of our party will have already left for traveling in our sister republic prior to the celebration in Mexico, D.F. You still have an opportunity to join us there if you see your travel agent immediately and also phone Chairman *Al Lloyd* of our Interim Reunion Committee at 401 596-4142 or Co-Chairman *Ed Dubé* at 617 944-1004, for detailed information. Letters may be addressed to *Al* or *Ed* at the addresses listed at the end of these notes, but haste is in order, especially if you and your wife would like to obtain the differing itineraries of our group so as to do some of your traveling with us.

If you have read the '21 Review news for the last few months, you know most of the fine Fiesta program, but *Al* and *Ed* will send you additional copies, together with the registration forms for the Mexico club and for the Class of '21. In addition to the many towns, museums, shops, sports, buildings, restaurants and other spots of interest—be they archeological, geological, historical or with various unusual sightseeing values—we urge you to see the *Ballet Folklórico* at the *Palacio de Bellas Artes*, with its twenty-two-ton Tiffany glass curtain, whether or not you have ever previously attended a performance. Particularly on a Sunday, Xochimilco will be a lovely place to combine a boat ride, flowers and fun with a group from '21. Don't let the talk of altitude scare you—take things easy for the first day or two and you won't notice any discomfort. The extremely dry air in March offsets the hot sun and you won't want to leave

the comfortable climate to go back home to the chill of spring. Take light clothing with one warmer change for the cool evenings. See you there!

Thanks

When, in the course of '21 events, it becomes necessary to ask someone to carry out an assignment, the Class has been blessed with willing workers who jump into the gap and always do what is necessary, without fanfare. One of the many is *Leon A. Lloyd*, 35 Spruce St., Westerly, R.I. 02891 (AI to you) who is in the process of engineering our third class visit to Mexico. AI agreed to serve as Chairman of our Interim Reunion Committee after he and Emma participated so enjoyable in our previous trip south of the border in 1967. If you have now registered for the trip this month, you know that he has accomplished the demanding task thoroughly and cheerfully. On behalf of the entire Class, our thanks go to Em and AI for all they have done for '21.

As an expected corollary, the Lloyds are extremely busy people, despite AI's retirement in 1962 as head of commercial and industrial sales for the Narragansett Electric Co., and the Mystic Power Co., and directorship in the latter company. He says he is now a "professional vagabond," but admits to an active association with Inquiry Evaluations, New York City, in market research. In his community, he is a thirty-five-year member of the Lions (a past president and secretary); for 20 years an administrator of the Girl Scouts; active in the Y.M.C.A. (past vice president and director during a twenty-five-year membership); a past president of the Chamber of Commerce; treasurer of the Camera Club; member of the board of managers and executive committee of the Rhode Island State Baptist Convention, and holder of many offices in 25 years of service to the Westerly and Pawcatuck Community Fund. He continued active in the Coast Artillery Reserve following S.A.T.C. service, and was graduated as a second lieutenant in the R.O.T.C. He was called to active duty in both the Quartermaster Corps and Corps of Engineers during World War II, retiring in 1954 with the rank of lieutenant colonel, the Commendation Ribbon and various citations.

Emma, too, has served the Girl Scouts in many top jobs since 1935, as well as the College Club, Hospital Aid Association Garden Club, and the Central Baptist Church. A former director of the Y.M.C.A., she received its "Service to Youth" award in 1965. She is vice president of her Wheaton College class and chairman of its 1969 reunion committee. The Lloyds have two married daughters, Edith and Barbara, both Simmons graduates; a married son, David, Tufts, and five granddaughters. AI adds: "I've been blessed in many ways—with a loving wife, wonderful children and grandchildren; with good health and many friends—especially those of the Class of '21."

Co-Chairman of our Interim Reunion Committee is *Edouard N. Dubé*, 216 Woburn St., Reading, Mass. 01867, who has long served the Class of '21 in a number of capacities. A Class Agent, with Ed Farrand, dating back some twenty years, Ed also served as Chairman of our reunion in Havana in 1958, the first to be held by any class outside the continental United States. He later chaired the first '21 reunion in Mexico in 1960. We are most grateful to him and to Maida as well for the tremendous amount of time and effort they have devoted to helping our Class.

Ed is an active member of the M.I.T. Club of Boston. He maintains his own offices at 120 Tremont St., Boston, 02108, as a consulting engineer, principally in the field of structural and mechanical engineering, but also including site engineering, utilities, heating, air conditioning, sewage treatment and related design and construction. A Fellow of the American Society of Civil Engineers and its Boston Chapter, he has also served as President of the Boston Association of Structural Engineers. He has been responsible for an unusually large number of extensive projects to build schools, hospitals, libraries, churches, banks, housing, office and industrial buildings, and various specialized government, municipal and privately owned structures. He served essentially as chief engineer, designer and construction administrator for the Bureau of Recreation of the State Department of Natural Resources in the building of



L. A. Lloyd, '21

Edouard N. Dubé, '21

numerous dams, bridges, boathouses, picnic and camping areas, including the required roads, electrical systems, water, sewer and sewage disposal systems.

His earlier experience had been in design and construction work for railroads and street car systems, for Palmer Steel Co., the National Park Service, the General Electric Co., Haller Engineering Associates and as treasurer, design and supervising engineer of Stewart Associates, Inc. He is involved in his community as Chairman of the Board of Cemetery Trustees of Reading, member of the Reading Housing Authority and Chairman of the Advisory Committee on the Reading Community Center. Maida is also concerned with local church and welfare activities and in maintaining close contacts with son Paul, Boston University, and daughter Caroline, Pine Manor School, both of whom live in Reading with their respective families. Lucienne, Boston University, and Anne Louise, Chandler School, are a little further away, but not enough to prevent the entire family, with the fourteen grandchildren, from gathering in Reading at Christmas time. Maida and Ed have managed to squeeze in some travel to the West Indies, Mexico, Central America, France, Switzerland, Italy and the eastern provinces of Canada.

We are happy and relieved to report that class prexy *Ray St. Laurent* has recovered from the serious operation reported in the last two issues of the *Review*. At this writing, he is preparing for another bout with the medicos for his arthritis and you may wish to write to him again at his home, 47 Gerard St., Manchester, Conn. 06040, or to telephone 203 643-6056 to inquire on progress and to cheer him up during his convalescence.

Marion and *George Chutter* and Betty and *Sumner Hayward* visited Helen and Ray St. Laurent in the hospital and also report on his excellent recovery.

Proper etiquette?

While it may still be proper etiquette to follow one's host, we were not aware that deferential officers also imitated the president. However, Class Vice President *Irving D. Jakobson*, Class Agent and

Estate Secretary *Edmund G. Farrand* and Class Council Representative *Henry R. Kurth* copied Ray's lead and went to their local hospitals. Latest reports are that all are doing well. They should all be home in normal pursuits as you read this, but they would like to hear from you. Write Jake at Northfield Rd., Glen Cove, N.Y. 11542; Ed at 5981 La Jolla Messa Dr., La Jolla, Calif. 92037, and Chick Kurth at Apt. C-85, 330 Beacon St., Boston, Mass. 02116. For the present, other Class officers will not be permitted this life of ease so there'll be someone left to run the store!

Right after the Alumni Seminar, *Joseph C. Morrell*, Dorset 5B, 90 Bryant Ave., White Plains, N.Y. 10605, wrote: "George Chutter just helped me celebrate a notable birthday with cocktails and Sunday evening supper." Congratulations, Joe; we're right on your heels! . . . We hasten to correct the home address of *Hyman J. Levensohn* from Auburndale, as reported in December, to 207 Gerry Rd., Chestnut Hill, Mass. 02167. . . . Out of a clear sky comes a notice from confirmed Long Islander *Allen D. Addicks* that he has moved to Apt. 612, 1868 Shore Dr., South Pasadena, Fla. 33707. Tell us more, Al. . . . *Henry A. Hutchins* has a new retirement home at 425-A Orange Grove Circle, Pasadena, Calif. 91105. . . . *Robert B. Frost* has retired as sales engineer for the Fuller Company in Catasauqua, Pa., and now makes his home at 208 Grove St., Putnam Conn. 06260. . . . *Henry Hutchings, Jr.*, Brigadier General, U.S.A., retired, receives his mail at 204-C Ruelle St., San Antonio, Texas 78209. . . . *Alfred J. Shaughnessy* has left his summer quarters in Wisconsin for his winter home at 501 Aylesbury Rd., Delray Beach, Fla. 33444. Right, Shag?

Harry Rosenfield reports moving his home to Brooks House, 33 Pond Ave., Brookline, Mass. 02146. Since Harry hasn't returned a class questionnaire for thirteen years, we're unsure whether this means retirement as owner-manager of National Laundry Co., and directorships in Monks Laundry and the National Diaper Service, Inc. In 1956, Ruth and Harry had three grandchildren. . . . *Abraham M. Aronson* has also not sent us a personal data form for many years and we are unable to tell more than that he now gives his mail address as 7 Exeter Rd., Jersey City, N.J. 07305. Mor had been associated with Magnetronics Control, Inc., Jackson Heights, N.Y. . . . *Anne and George Schnitzler* have confirmed their seasonal trip from Chestnut Hill, Mass., to their winter home at 1076 Venetian Way, Miami, Fla. 33139. . . . *Edward W. Noyes*, who spends the summer at his home in Thompson, Pa., has left for his winter abode, where you can address him via Route 2, Pelican Cove, Stuart, Fla. 33494. . . . Our receipt of a gorgeous set of Polynesian stamps marked the return of *Saul M. Silverstein* from a ten-week business and vacation trip, accompanied part of the way by Rigi. Saul says he did not have time to see Catharine and *Harry Field* in Hono-

lulu when he was enroute home from Hong Kong, Korea, Japan, Tahiti and Bora-Bora.

The ministry reports

Thanks to the Rev. Dr. *Williston Wirt*, retired minister who lives at 694 Priscilla Way, Claremont, Calif. 91711, we did reach long-lost Rev. *William F. Hastings*, minister of the First Congregational Church, 119 E. Holcomb St., Athens, Mich. 49011. Maxine and your Secretary planned to visit Ruth and Gill when we drove to Michigan last fall to see our daughter, Ellie, and her family, but, regretfully, flu changed our plans.

We have exchanged several letters with Bill, who says, in part: "I fear that Williston Wirt and my relatives in the Pilgrim Place retirement colony have made me out more important than I actually have been. I am still carrying on as pastor of a small church of 210, with a Sunday School of 200. When I last saw Will, he was pastor of the North Church, Berkeley, Calif., of which his father had once been pastor, and where my youngest sister and her family were members. He and I felt kinship because we both had engineering training—in Courses XV and VI, respectively. I was later graduated from Haverford in engineering and physics and took graduate courses in physics at Columbia, but 'fell by the wayside,' went to Union Theological Seminary and entered the ministry, something I had long wanted to do. By all means, stop to see us if you can. If you will take pot-luck or let us know ahead of time, we might stir up a meal—I have a good garden for fresh vegetables."

Bill is a native of Milford, Neb., and a member of the Fairbank family, long noted for missionary activities. He has had pastorates in Montclair, N.J., Ithaca, N.Y., Middlebury, Vt., San Juan, P.R., Ravenna, Ohio, and Hudson, Mich. He was secretary of the displaced persons program of the Congregational Christian Churches in New York City as well as chief of resettlement of the World Council of Churches for Germany and West Berlin, with headquarters in Stuttgart, Germany. While at Middlebury during World War II, he doubled as a teacher of physics to Navy V-12 units at Middlebury College. Bill's activities are legion—Rotary, Kiwanis, Lions, former director of the Ithaca Y.M.C.A., secretary of the board of directors of the Presbyterian Hospital in San Juan and director of several commissions, convocations and conferences within the United Church. He and Ruth co-authored a book, *Puerto Rico, Today and Tomorrow*, published by Friendship Press, New York, in 1947. Bill says his recreations include the violin, tennis, "barnyard golf" (horseshoe pitching), swimming and gardening. Son Charles is a research engineer and computer designer with Control Data Corp., and there are three grandchildren. Hope to see you on our next trip, Bill, if you don't get to Brielle first.

Getting settled

We gave you the new address for *Antonio H. Rodriguez* as Apartment 10-C, 4015 Bayshore Blvd., Tampa, Fla. 33611. Helier writes that Graciella and he are located in a tower apartment building on the boulevard bordering Hillsborough Bay, amidst an area of one and two story private homes, so they have an extensive panoramic view from their terrace all the way to downtown Tampa, four miles distant. They had a pleasant trip from Madrid and have been busy selecting an adequate place to live. Olive and *Ollie Bardes* of Cincinnati were hosts to Graciella and Helier at the inaugural ceremonies of the new Bardmoor Country Club and residential development near St. Petersburg and also at a gala dinner at Treasure Island on the same night, attended by those connected with Ollie's elegant enterprise.

First Jackson Professor named

Especially if you were in Courses VI, VI-A or old Course XIV, you will recall our sincere friend and world-famous teacher and mentor, the late Professor Dugald C. Jackson, head of the Department of Electrical Engineering from 1907 to 1935, founder of the engineering firm of Jackson and Moreland, and father of our *Dugald C. Jackson, Jr.* The late President Karl T. Compton established the Dugald C. Jackson Professorship at M.I.T. following Professor Jackson's retirement.

It is a pleasant duty to report portions of a recent letter from our classmate, President *Howard W. Johnson*, to Dug Jackson, advising that the Institute has now advanced funds for endowing the Jackson chair and has named as the first Dugald C. Jackson Professor of Electrical Engineering, Dr. Gordon S. Brown, '31, a former student of Professor Jackson's and Dean of the M.I.T. School of Engineering since 1959, who wished to be relieved of administrative duties to return to active teaching and other interests. We personally take great pride and satisfaction in this action, especially in recollection of the kindness and assistance which Professor Jackson extended to us as an undergraduate. We suggest that many of the Class may wish to consider designating their annual gifts to the Amity Fund or making additional gifts to support the Jackson Professorship, so it will ultimately be fully endowed from such gifts.

Good reading

To really know the M.I.T. of today, you should read the *Report of the President, 1968*, by our distinguished Howard W. Johnson, sub-titled "An M.I.T. Education for Our Times." Get a copy of this profound discussion of the "awakening university" and study it carefully. Were you startled by the letter on student housing from Ken Wadleigh, '32, Dean of Student Affairs, which accompanied letters to the Class from Ed Farrand and Ed Dubé? If so, you should now get a copy of Dean Wadleigh's current annual report to the President and ponder the two electrify-

ing subjects, *Student Activism* and *Student Housing*, both revealing the deep insight of the M.I.T. Administration and the breadth of its tremendous capabilities.

Noted in the *Report of the President* is the promotion of John A. Steffian, son of our Assistant Secretary, *Ted Steffian*, to be Assistant Professor in the M.I.T. School of Architecture. A new appointment is that of Nelson C. Lees, '53, son of the late Cornelia Nelson Lees, '21 and Malcolm B. Lees, '20, who was named Director of the Development Office at M.I.T. Unfortunately, our good friend, Harold Bugbee, Secretary of the Class of '20, overlooked the credit due the distaff side of the family in his enthusiastic note in the *January Review*.

At the Clarks

During frigid mid-December, Alex and *Munroe C. Hawes* were among the dozen dinner guests who helped Maxine and your Secretary celebrate our 40th anniversary in Mac's comfortable studio in our Brielle home. We took a leaf from Betty and *Dug Jackson's* book and told our own youngsters in Michigan and Northern New Jersey that we would invite only close friends from nearby; that our family would be asked to second celebration here next summer, under less hazardous travel conditions.

Maxine is receiving congratulations and wide publicity on the unveiling of a lovely mural she painted for the Brielle Library. She had another solo exhibition of landscapes, seascapes and pastel portraits throughout the month of January at the Bloomfield Art League, during which time she gave a public demonstration of her pastel techniques by doing a portrait from life. The show had several scenes from the area of Helen and Ray St. Laurent's summer home at Vinalhaven, Maine, in specially made frames from unpainted wood of an old Maine barn.

We know you join us in heartfelt sympathy to *Robert W. Haskel*, 51 Marked Tree Rd., Needham, Mass. 02192, whose wife, the former Doris E. Pike of Colebrook, N. H., died last December 21. Doris had been branch librarian in Needham and active in the Congregational Church. *Crystella* and *Webster K. Ramsey* came to pay their respects. Bob's son and daughter live nearby and have been a great help and comfort. Bob says: "Lucky I've got my business to keep me busy. Sorry, I can't make Mexico now." He is a part owner, director, and director of engineering of Standard Chemicals, Inc., Natick, Mass., research, field engineering and product quality control firm. . . . *Walter A. Anderson* tells of moving his home from Bellaire, Ohio, to 530 Ackerson Rd., Brightwaters, N.Y. 11718. Since he has not given us his personal data record for many years, we cannot print details. . . . *John T. Rule*, 463 Camino Manzano, Santa Fe, N.M. 87501, Emeritus Professor of Graphics and former Dean of Students

at M.I.T., wrote to the *Puzzle Corner* to help solve a problem in the *January Review*. Wish he would write us and help solve ours! . . . *Richmond S. Clark*, formerly of Baytown, Texas, writes that he and Mary Louise should now be addressed at P.O. Box 1400, La Porte, Texas 77571. We'll quote in a later issue their welcome letter about the new home. . . . Betty and Assistant Secretary *Sumner Hayward* just met Maxine and your secretary for lunch at a restaurant off the Garden State Parkway halfway between our respective homes—Ridgewood and Brielle—to exchange '21 news and help Sumner plan to join us in Mexico this month. Our new Assistant Secretary has always been most helpful in collecting information for these columns. He and Betty look years younger as a consequence of their enjoyment of continued travel abroad and in this country.

A job well done

Our long time friend Kenneth R. Wadleigh '43, Dean of Student Affairs at M.I.T., says an M.I.T. professor of his once remarked, "To be a success, you've got to like your work, enjoy and respect the people with whom you work and, once in a while, you have to have a 'pat on the back' for a job well done." We have tried hard to qualify on the first two counts and Maxine and your Secretary are enormously gratified to receive your generous "pats" in the steadily increasing number of annual Christmas and New Year greetings we receive from so many good M.I.T. friends. We hope you'll pardon our vanity in asking you to keep it up! We'll run many of the warm messages in later issues.

Thanks from the bottom of our hearts go to: Jill Ackerstein, Anne and Wally Adams, Pat and Allen Addicks, Olive and Ollie Bardes, Elizabeth and John Bar-riger, Ednah Blanchard, Ray Brooks, '17, Ken Brock, '48, Ethel Burckett, Mary and Buck Buckner, Jack Cannon, '24, Marion and George Chutter, Mary Louise and Rich Clark, Edna and Phil Coffin, Clara and Asher Cohen, Luisa and Nish Cornish, '24, Maida and Ed Dubé, Helen and Ed Farrand, Catharine and Harry Field, Alma and Vincent Fulmer, '53, Eddie and George Gokey, Betty and Morrie Goodhart, '35, Margaret Goodhue, Polly and Roland Greeley, Bob Haskel, Alex and Munnie Hawes, Betty and Sumner Hayward, Betty and Dug Jackson, Ruth and Irv Jakobson, Brenda Kelley, Marge and Jack Kendall, Ruth King, Sue Kramer, Laurie and Chick Kurth. Also to Killian Lansingh, '26, Eileen and Moose LeFevre, Betty Ann and Fred Lehmann, '51, Emma and Al Lloyd, Leila and Sam Lunden, Kay and Bill Mc Tighe, '54, John Mattill, Milicent and Joe Maxfield, '10, Helen and Bob Miller, Helen Mosher, Kay and Phil Nelles, Karen Oddo, Muriel and George Owens, Conchita and Harry Pearson, '23, Marty and Bill Ready, Graciella and Helier Rodríguez, Helen and Ray St. Laurent, Maria and Armando Santa-cruz, B., '54, Anne and George Schnitzler, Olena and Juan Schwarz, '44, Don

Severance, '38, Deborah Shapley, Madeline and Rufe Shaw, Rigi and Saul Silverstein, Eric Smith, Panos Spiliakos, '66, Edith and Harry Thomas, '25, Helen and Lem Tremain, '23, Louise Tucker, Ruth and Ralph Wetsten, India and Dave Woodbury, Dick Wright.

Stop the press! *Oliver L. Bardes* just phoned from his home, 2627 Grandin Rd., Cincinnati, Ohio 45208, that he and Olive will join us at the Mexico reunion. Ray St. Laurent also phoned that Beryl and *Dana E. Kepner*, 550 Alcott St., Denver, Colo. 80204, are planning to be there. Who else for Mexico? We didn't learn whether Marge and *Jackson W. Kendall*, 401 Hermosa P., South Pasadena, Calif 91030, will join with the Kepners. Marge and Jack earn our sincere thanks for sending the official Tournament of Roses and Rose Bowl Game programs in full color, to enhance our enjoyment of these two events on color television.

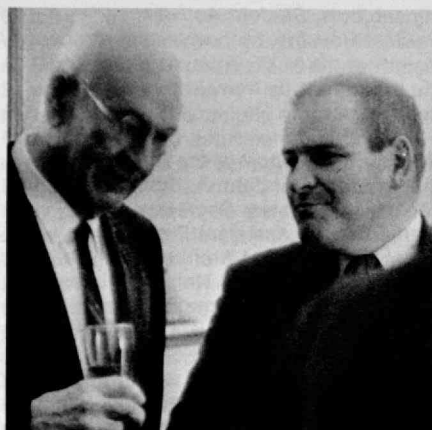
Classmate deceased

With heavy heart, we record the passing of *Paul Nathaniel Anderson*, President of Dahlstrom Manufacturing Co., Jamestown, N.Y. 14701, on December 10, 1968, and extend, for the entire Class of '21, our sincerest sympathy to his family. Paul's death was sudden. He had planned to retire at the end of last year. His loss is keenly felt by his family, the community in which he spent all his life and by his M.I.T. classmates.

Born in Jamestown on September 10, 1898, he was a graduate of Staunton Military Academy and prepared for the Institute at Andover. As an undergraduate, he was a member of Phi Sigma Kappa, Osiris, the Beaver Club, the Institute Committee and its finance sub-committee. He was simultaneously President of the M.I.T. Athletic Association and the New England Intercollegiate Athletic Association and won the varsity "T" as manager of the track and cross country teams.

During World War I, he was a sergeant in the S.A.T.C. at M.I.T. Paul was graduated in course IX-B and immediately became associated with the Empire Case Goods Co., Jamestown, as assistant superintendent. He later became vice president and treasurer before his election, in 1934, as president and general manager of the Dahlstrom Metallic Door Company (now Dahlstrom Manufacturing Company) and continued in this position to the time of his death. Son of a prominent Jamestown industrial leader, Paul took an active part in local affairs. He was chairman of the board of public utilities for more than a decade. Vice president of the Jamestown Furniture Mart, he was also a director of the Bank of Jamestown. He was a former president and chairman of the Jamestown Manufacturers Association; a director of the former Hotel Jamestown; formerly on the board of the Jamestown Malleable Iron Co., the Jamestown and Northwestern Railroad, the National Association of Manufacturers, the Lake View Cemetery

Among those present on December 6 to honor the Class of 1922 Professors (left to right below): Donald F. Carpenter, '22, Senior Vice President of the Class; John Wulff, the first Class of 1922 Professor (electrical engineering); Parke D. Appel, '22, President of the Class; Oscar H. Horovitz, '22, Assistant Secretary of the Class; and William H. Mueser, '22, Vice President of the Class. In the pictures at the right, Mr. Carpenter with Professor Wulff (left), and Warren T. Ferguson, '22, Assistant Treasurer of the Class, with Professor Gray.



Association, Chatauqua Institution, Jamestown Mutual Insurance Co., and a former president of the Norden Club. His memberships included the Sports-men's and Union Clubs and Moon Brook Country Club; Mt. Moriah Lodge, F. and A.M.; Western Sun Chapter of Royal Arch Masons; Jamestown Commandery, Knights Templar; Jamestown Consistory of the Scottish Rite, and Ismalia Temple, Shriners of Buffalo.

He is survived by his wife, Mrs. Cecille Ogren Anderson; five sons, Paul N. Anderson, Jr., M.I.T. '48, Lakewood, N.Y., Frank O. Anderson, 2d, Bloomfield Hills, Mich., Daniel O. Anderson, Ridgewood, N. J., R. Quintus Anderson, M.I.T. '54, Jamestown, and J. Timothy Anderson, 1954 captain and star of the Harvard football team, Boston, Mass.; a sister, Mrs. Alvin J. Swanson, San Jose, Calif., and fourteen grandchildren. He was preceded in death by a son, Charles O. Anderson, and a sister, Miss Eunice Anderson. We are indebted to Eddie and George Gokey, Paul's neighbors in Jamestown, and to Paul N. Anderson, Jr., for their cordial letters and considerable aid in preparing these notes. We are particularly shocked to learn of Paul's sudden passing in view of recent correspondence with him directed toward receipt of a picture to accompany a vignette in these columns.

Calendar for your wife and you: '21 Interim Reunion in Mexico at the 21st annual Fiesta of the M.I.T. Club of

Mexico City, March 13 through 15; M.I.T. Regional Conference, Garden City, N.Y., March 15; M.I.T. Regional Conference, St. Louis, April 12; Homecoming on campus in Cambridge, June 8 and 9; 50th Reunion, Class of '21, June 10 through 14, 1971. Please write now and tell us we'll see you at least at one of these enjoyable gatherings.—*Carole A. Clarke*, Secretary, 608 Union Lane, Brielle, N.J. 08730; *Edwin T. Steffian*, Assistant Secretary, Steffian, Steffian and Bradley, Inc., 19 Temple Place, Boston, Mass. 02111; *Sumner Hayward*, Assistant Secretary, 224 Richards Road, Ridgewood, N.J. 07450; *Leon A. Lloyd*, Chairman, Interim Reunion Committee, 35 Spruce Street, Westerly, R.I. 02891; *Edouard N. Dubé*, co-chairman, Interim Reunion Committee, 216 Woburn Street, Reading, Mass. 01867

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The Buffalo manufacturer of sweatshirts emblazoned MONEY ISN'T EVERYTHING has gone out of business. That's because *Dale Spoor* is performing his duty as '22 Class Agent and wants every dollar he can get. Dale and Katherine spent Thanksgiving with their nieces in Southern California and enjoyed lovely weather. Dale writes: "on the way, we stopped off in Phoenix for a two day visit with Hardy and *Jack Liecty*. Jack retired from the power company two or three years ago as Financial Vice President, and has been busy travelling and

judging dog shows since, as well as enjoying their lovely home in 'Cactus Patch' at Phoenix. Since returning, we have had a letter from Hardy from which I quote: 'The trip to Yuma and Brawley was a bit strenuous, but we enjoyed it. Jack judged the dog show for two days, then drove 285 miles home. The little Volvo behaved beautifully, and I enjoyed riding in it, but I have no desire to drive it. Mexico was delightful. The Balboa Club at Mazatlan was just as plush as we had been led to believe,—lovely rooms, lovely settings, perfect service, beautiful beach with water about 70°. It was the off-season between Thanksgiving and Christmas, and we couldn't even find any bridge partners.' (They asked about the schedule for the M.I.T. Fiesta in Mexico, and said that they were planning on going down for the occasion,—Hardy said she hoped that they would fly, rather than the long drive.) Jack keeps as busy as he wishes with his equipment leasing business, and takes a business trip to Philadelphia every couple months or so. Cordially yours, Dale." His letter has been acknowledged with thanks for the news.

The usual unusual sketch on the Christmas card of "The Kurtz's" shows Carlys and *Frank* basking in the ocean at Delray Beach, then travelling northward through Williamsburg, Richmond and Winston-Salem to a 50th high school reunion at Elizabeth, N.J. From there they vacationed at Skytop, Pa., and on to Trumbull, Conn., where their picture shows four

grandchildren riding bicycles in front of their family home in a wooded area. From Connecticut they journeyed up to Cambridge and to Cape Cod before going back to sunny Florida. They also show their family of four in Medellin, Colombia. This group is apparently betting on whether their newest addition will be a boy or a girl. Thank you Frank for your good wishes.

The year has been good

The following letter was received from Roy A. Stone of New Fairfield, Conn.: "Dear Whit: The enclosed will fill in pretty well on our doings lately. On our trip south we visited the first day two '22ers Tom Gill and Gus Hemeon at Leisure Village, near Lakewood, N.J. We had wonderful visits with Chase Whittum and wife at Rock Hall, Md., on the way down, and Elmer Sanborn and his wife at Atlanta on the way back. We also spent a fine evening with Tom Taylor and his wife at Naples, Fla. I called up several other '22ers too but saw no other ones on the trip. It is heart-breaking how the classmates are dropping off. Don Knight who died a few years ago was one of my particular friends around Boston in Tech days and Maurice Williams who died this summer was another one. There were several '22 men and wives (or without) at the November Seminar, Izzy Loss, R. H. Brown, Dale Spoor and Margaret Kimball who took Architecture. I suppose all is bliss and roses up in that snow belt. Well I'm not one to say it's so here. We have plenty. Best regards, Stoney."

Another note from Roy and Marian tells: "Of present and future importance and interest also to Roy and me was our trip from July 12 to August 1 in the South investigating possible retirement sites, our itinerary based mainly on such books as *2001 Best Places to Retire*. Our 5,345 mile trip in our newly air conditioned car included overnight stops. . . . At many places we stayed with friends. Our most distant point was Key West. We were so fortunate as to be able to include the Smokies on our return.

"Roy returned to his R and D work in Danbury. Soon after, I was back at my B.O.C.E.S. jobs at Pawling and Dover. Carol came home early in September to concentrate on wedding plans. Roy spends his spare time making improvements and corrections in the house and yard, the main ones being a large screened back porch and trees transplanted for better shade by porch. As has been his custom for years, he goes one evening a week to 'where the health promotion is good.' From New Fairfield, this happens to be Seymour, where he finds gym, sauna, cold shower, lounge, oil rub, and another shower the best formula he knows for getting through the winter.

"The year has been good to us in many ways. We have especially appreciated being able to see many of our friends and relatives . . . on our trip. . . . We

hope we shall have the same privilege during 1969. May good fortune be yours. Roy and Marian." Our best wishes and thanks go to Roy and Marian Stone.

Charles E. Brokaw of Denver has retired to an office at home from which to consult. He has "less time not to do more things." Mrs. Martha E. Munzer of New York City is publishing a new book in the spring, *The Valley of Vision—TVA Years*. The publisher is Alfred A. Knopf. William G. Rapp of Larchmont, N.Y. retired in 1962 as Assistant General Manager of Erektion. He has been a Safety Consultant since 1964 for Standard Structural Steel Co., fabricator and erector of structural steel. He has published a book this past year entitled *Construction of Structural Steel Building Frames*.

F. Willet Walton, Jr., of North Edgecomb, Maine, is busier than ever in pseudo-retirement—in the nursery and landscaping business. He just does not understand how to have good health without keeping busy and making everything worth-while. Howard F. Baldwin, of Baltimore, Md., is enjoying retirement after almost two decades as architect with the Maryland State Health Department. This was a designated State Agency for administration of Federal "Hill-Burton" program-grants for hospital construction. A splendid portrait shot taken by Oscar Horovitz of Newton was included in the winter issue of Eastman Kodak's *Kodak Movie News*. We are indebted to T. Spencer of Weston for the magazine.

Addresses

As a correction in address we now publish Dr. Eastman Smith, Mountain Home, Ark.—not Kansas as previously noted. Among the changes of address reported are those of: John O. Beasley, Alexandria, Ind.; Lachlan MacKenzie, Sun City, Calif.; Joseph Greenblat, Ft. Lauderdale, Fla.; Edmund F. O'Hearn, Brookline, Mass.

Classmates deceased

The sympathy of our Class goes to the families of: Richard P. Schonland, Covina, Calif.; Alexander D. Ross, Montreal, Canada; Walter G. Chick of Roslindale, Mass. Walter was a graduate of the Harvard Business School and attended M.I.T. briefly.

On this sunny day in Buffalo in January, your secretary and his ever-faithful roommate are leaving for Scottsdale to interview classmates there. This is not to get away from the deep snow, which there is in the ski area twenty miles south of Buffalo whereas our city streets are clear and dry. Our trip is for a change which some great wit has said is as good as a vacation.—Whitworth Ferguson, Secretary, 333 Elicott Street, Buffalo, N.Y. 14203; Oscar Horovitz, Assistant Secretary, 33 Island Street, Boston, Mass. 02119

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As a result of my needling I was successful in hearing from our good friend, Horatio Bond. He writes: "As of the end of 1968 I am retiring as chief engineer of N.F.P.A. This is an international center for information on technical data relating to fire problems and I have been associated with the M.F.P.A. since 1924 and have been chief engineer since 1939. The main work of our Association is to prepare a great many of the familiar standards that deal with fire matters: the National Electric Code . . . and many other subject areas. . . . It is my plan to continue part-time consulting work for the N.F.P.A. and to maintain . . . an office at 60 Batterymarch Street in Boston . . . (we) will continue to live in Hyannisport, Mass." Good to hear from you Bondie! Good luck! We all wish you a happy and profitable retirement!

We also heard from Forrest Lange. "While in Brunswick, Maine for the Christmas Holiday, I had a nice visit with Philip S. Wilder who left us before graduating and finished at Bowdoin College. He is retired but continues to be Bowdoin's Advisor to Foreign Students. He has held several positions at Bowdoin including Assistant to the President of Bowdoin as well as Class Secretary and Secretary of the Alumni Association." We learned further from Forrest that Bowdoin also has a high rise building which serves as a Senior Center, where, unless they are married, all seniors must live. This very modern building, planned for maximum utility, has very fine views of the surrounding country, and on a clear day it is possible to see Mt. Washington, a distance of 120 miles. We will see more of this sort of thing on many college campuses in the future that have no room for expansion except upwards, as at M.I.T.

Forrest also sent me a news clipping he was picturing him in the process of preparing a lecture on Hawaii to be given before the Portsmouth Chapter of the National Association of Naval Technical Supervisors in Portsmouth, N.H. He is a past Vice President of the NANTS.

Miles N. Clair has written me, also in response to my needling, on the letterhead of Thompson and Lichtner, Inc., Engineers, Brookline, Mass., to the effect that he plans to keep on as the head (President) of T & L, Inc., as he enjoys the work "more than anything that retirement has to offer." Miles has achieved much of note in his career, recently being the recipient of the Howard Cooley Award of the U.S.A.S.I. for "notable achievement and service to the national economy through voluntary standardization, and outstanding support of standardization as a tool of management." Miles joined the company in 1925 after receiving his M.S. in civil engineering from M.I.T. in 1923. He became Vice President in charge of Engineering of this firm in 1928, First Vice President and Treasurer in 1930 and President in 1950.

He has been prominent in the development of special concretes, was a Vice President of A.S.A. (predecessor of U.S.A.S.I.), a director and a member of its Standards Council. Drexel Institute, from which he graduated with a B.S. in engineering in 1921, awarded him an honorary doctor of engineering in 1960. We are very happy to hear about the accomplishments of our classmates. We would like to learn more from others of '23 who have not responded as yet to my pleas.

Changes of address

Paul B. Brown, Apt., C, Oxford House, Oxford Place, High Point, N.C., 27260; *Major John C. O'Flaherty*, 3715 S. Gilpin St., Englewood, Colo.; *Leslie W. Powers*, Apt., 4, 164 116th Ave., Treasure Island, Fla., 33706; *Erwin G. Schoeffel*, 2830 S. Ocean Blvd., Palm Beach, Fla., 33480; *Benjamin Cooper*, 335 Newtown Tpke., Wilton, Conn., 06897.

From a cryptic note from ex-secretary Lange, we learn that his letter of last July was returned from Tasmania marked by the Aussies "not H.E.C a.t.s." This involves *Erling Skabo* who last received mail at the Hydro Electric Commission, Hobart, Tasmania, Australia. This is too bad because Erling was one of the first "foreign students" that I met back in 1919. I'll bet he could give me some good copy for these columns. Please can any one help me to track down our good friend Erling?—*Thomas E. Rounds*, Secretary, 25 Ridge Road, Danbury, Conn. 06810

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Governor Ferré evidently did not have the trouble in filling out his Cabinet that was forecast for him. He simply bypassed the politicians. The N.Y. *Times* said: "His 10 Cabinet members, whose average age is 47, represent a mixture of academicians and successful business men." Luis is doing his part as a traveling salesman. The society columns of Boston's papers gave a lot of space to a big affair late in January for the benefit of underprivileged Puerto Ricans in this area. Highlight of the occasion was the appearance of the new Governor and the Mayor of San Juan.

Howard Whitaker seems to work things out pretty well. He took on an I.E.S.C. job in Korea, financing and feasibility studies for a paper mill. Normally the Whitakers would have traveled west, but they have a son, daughter-in-law, and brand new grandson in Turkey, so appropriate arrangements were made and they arrived there just in time for Christmas. Then on for a winter in Korea.

Retirements

In November a card arrived from *Bill MacCallum*: "Starting my retirement with four weeks in Australia, between three-week trips on Matson liners to and from. Have covered 2,000 miles of the East Coast from Melbourne to the Barrier Reef. A great country. Drove 800 miles

by Avis car. The rest is travel by jet, bus, helicopter, etc." Considering the peripatetic life Bill has led for so many years, this sort of tapering off seems perfectly logical.

Larry Feagin is another who started off retirement with a travel whirl, although this was not a continuation of a way of life, as was Bill's. Larry's travels in recent years have been confined to the lower Mississippi. "Had a great trip last summer with my wife Cassie and members of the Mississippi Seniors Golf Association. Went To Hawaii, Japan, Hong Kong, Bangkok, and returned via New Delhi, Beirut, and points of interest in Europe including [and this was certainly a logical last stop for a bunch of golfers] St. Andrews in Scotland. Decided we'd better go while we were still mobile." From that itinerary the Feagins certainly proved their mobility.

Tien Koe is still another retiree who has gone in for travel in a big way. Last spring he and Mrs. Koe went to Mexico for the Fiesta. Maybe that hooked them on Latin America, for then in the fall it was South America, "... a month-long sightseeing trip to Machu-Picchu in Peru, Chilean and Argentinian Lake Regions, Iguassu Falls, and finally 8 days in Rio were highlights of our trip. Took many pictures. Last year our travel pictures won first place in a series of color slide competitions by a local (Harrisburg) camera club." Maybe we should have a travel slide competition at Bald Peak. Most of our long distance boys will be there. One interested spectator would be *Paul Blampied*. "Now devote my energies to cruising my little schooner 'Priority' around New England in summer, but doing it by liner and freighter in winter. Principal interest, the many out of the way islands. Hope to learn of interesting trips at our retiree get-together in June." There will certainly be plenty of advisers on hand.

The *Richard T. Lassiters* didn't get quite as far afield, but in August they spent a week in Quebec at the Chateau Frontenac. It was the 50th Anniversary Conclave of Phi Mu Delta, and Dick was general chairman. In November he and Bee came up to Cambridge for the Alumni Seminar, went away knowing all about computers, or at least their impact on society. And Professor *Bob Siskind*, on a vacation trip through New England last summer, stopped in again to see *Leigh Fogg* in Gorham, N.H. "Fine visit," says Bob.

George Anderson retired from Bucyrus-Erie a couple of years ago. He is still living in Milwaukee and doing a bit of consulting for his old firm, but finds he has less and less time for such mundane activities. At Christmas he and his wife joined their daughter and her family at the modern planned-community of Reston, Va., which has had so much publicity and money troubles. They were joined there by their son Griffin (S.B. '60 and S.M. '62, M.I.T.), a NASA research engineer, and his wife (also S.M. '62).

"So we had a merry and non-too-quiet time of it with 11 in the household!" *Jack McCoy* is enjoying retirement as much as ever, and can now boast of 11 grandchildren. *Paul Cardinal* has passed the boasting stage. He has trouble enough just keeping count. At the moment No. 23 is on the way!

That's our boy!

A striking portrait of the Reverend Denton Massey in full clerical garb graced the cover of a fall issue of a Canadian magazine, *The United Church Observer*, and the feature story was about him: "*Denton Massey*: What happened to the man who had—almost—everything?" It traced his history in some detail, all the way from M.I.T. to Waterloo, Ontario. And a varied history it is: working up in the family's vast Massey-Harris organization; organizing and running the largest Bible class in history; conducting the first radio religious service in North America; advertising; Member of Parliament (with some talk of his becoming Prime Minister); war-time service in the R.C.A.F.; one of the first importers of foreign sports cars; nuclear reactor salesman; and at last ordination in the Anglican Church and the rectorship of the Church of the Holy Saviour in Waterloo. Sub-head to the article is: "Thousands struggled to get into his Bible class. (Some of the meetings were held in Toronto's Maple Leaf Garden.) Some said he might be Prime Minister. He was rich, famous and powerful. But that wasn't enough." Guess that about sums it up. Does he have enough now? "What private income I have goes in trust. I believe I should live on a rector's salary. Thank heaven the golf club has clergy memberships." And he describes himself as being "fantastically happy."

But there's one thing he hasn't given up, his love of sporty cars. Remember Dent's beautiful Packard roadster that we tied on the end of our rope at the Tech Night tug-of-war? And how, in the dark, we couldn't see that our opposition had the same idea, but they used a truck? And how Dent's battered beauty limped away from the field of combat with a few stripped gears? The writer of the article reports: "The only sign of the wealth which over the years sometimes was his and at other times eluded him is the sleek and powerful car whose horsepower he demonstrated with boyish enthusiasm as we careened around a curve." That's our boy!

Classmates deceased

Last November *Bengt R. F. Kjellgren* died in Cleveland at the age of 74. A 1918 graduate of the Royal Institute of Technology in Stockholm, he came to M.I.T. in our senior year as a Scandinavian Scholar. He stayed in this country, first as a research engineer with the Brush Laboratories in Cleveland, then eventually as president of the Brush Beryllium Co. He worked on the Manhattan Project, and with the Navy on Polaris submarines. Bengt retired as board chairman in 1964, having suffered a stroke two years earlier.

A second death was that of *George M. McIlveen* in October. George was with us for two years, getting his degree in mechanical engineering. You may remember our reporting a while back that, after many years in the steel business, he had gone to Washington to take on a civilian job with the Army. He had been living in Arlington, Va.

On this sorry note we wind up another column. Only three and a half months to Bald Peak.—*Henry B. Kane*, Secretary, P.O. Box 177, Lincoln Center, Mass. 01773

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The first item of business for this month is to remind those of you who had intended to make a special gift to the Alumni Fund in memory of "*Ave*" *Stanton* that it is not too late to take care of this during the present Alumni Fund Drive. Several gifts have been received in his memory, and I expect there are many others who just need a reminder.

Classmates deceased

An article in a recent issue of the A.I.M.E. publication, *Mining Engineering*, notes that *Edward B. Jennings* passed away on July 26, 1968, at Jefferson City, Tenn. Ed served as a pilot in the aviation section of the Signal Corps during W.W.I and attended Stanford and the Colorado School of Mines before coming to M.I.T., where he took his degree in mining engineering. This article indicated that he had a varied and colorful mining career, exploring for copper, radium and zinc in Arizona, Utah, Colorado, New York and Tennessee. He was associated with a number of mining companies, but since 1927 he had been with the United States Steel Corporation, retiring as Superintendent of their zinc mines some ten years ago. He was an active member of A.I.M.E. to the point that at their annual meeting in February of 1968, the Legion of Honor was bestowed upon him.

Another death has been reported—that of *Frank L. Hall* in Bartonsville, Vt., on November 14, 1968.

Retired . . . for two months

A number of notes have come via the Alumni Office. *Russell G. Meyerand* notes that he retired from the Union Electric Company on November 1, 1967 after thirty-four and one-half years' service. However, he resumed work on January 2, 1968 as a Consulting Engineer for the Moloney Electric Company, St. Louis, and on December 6, 1968 was designated "Engineer of the Year" by the St. Louis Section of Institute of Electrical and Electronic Engineers.

A recent article in the Hartford, Conn., *Courant* noted that *Russell G. Meyerand, Jr.*, Class of 1955, with a Doctorate from M.I.T. in Physics in 1959, became Director of Research at the United Aircraft Corporation about a year ago at the age of 33.

Another retirement is that of *Alexander Brown* who had been Director of the Chemical Engineering Department of Emery Industries, Inc. Although he retired officially on May 1, 1968, he continues with the same firm in a consulting capacity, full time. During the past October, he vacationed in Portugal.

Don Taber notes that he has now become part-time President of the American Pad and Paper Company so he will be spending three or four months this winter at his condominium in Baco Raton.

James Howard, active on the Alumni Fund, is just now, in January 1969, starting semi-retirement after 42 years' employment with the Standard Thomson Corporation. He will be doing part-time consulting for them.

Millard L. Caldwell writes from Berkeley, Calif., stating that he has retired as Patent Attorney from Shell Development Company, the research subsidiary of Shell Oil Co., with offices in San Francisco. Contrary to his plans, he has bought an Airstream Trailer and has been to Mexico with it, where he spent three months in Guadalajara. His wife's Spanish helped to make it a wonderful experience.

From Saigon comes a note from *Finlay Cameron*, indicating that he has completed one year of a three-year contract as Management Consultant to the Saigon Power Company. The contract is between Commonwealth Associates, Inc., his employer, and the Saigon Power Company.

William "Rick" Wheeler in his note indicates he retired from the American Telephone and Telegraph Company in February 1968 and move to Southbury, Conn. To keep occupied, he is a volunteer assistant to the First Selectman in setting up a capital improvement program and studying the form of government which might better serve the citizens of his community.—*F. L. Foster*, Secretary, Room 4-144, M.I.T. Cambridge, Mass. 02139

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It's surprising but in between the task of preparing the Notes and writing them, your secretary has washed both cars—on January 19th! Pigeon Cove has experienced an unusually mild winter, while as close as Newburyport the ground is ice and snow covered. We can get clobbered any moment but to go beyond mid-January with no snow is great—particularly since this is the last winter of driving 42 miles to Boston to punch the DuPont time clock. The age of retirement is really here for the Class of '26. Every item we have laid out for this issue either involves retirement or appears to.

Just this week *Pink Salmon* sent us a page from the annual report of Joy Manufacturing Co., from which we quote, "At the close of the fiscal year, Mr.

James A. Drain, having reached age 65, retired as Chairman of the Board and Director. . . . The many valuable contributions made by Mr. Drain . . . during . . . long service are gratefully acknowledged." Jim has never been one to write the class secretary so we just hear about him. Now with time available you can write us your plans.

A letter received some time ago from *Jim Offutt* reports on a couple of our Chinese classmates. "Dear George, I retired on November 1, 1967 after forty years with United States Gypsum and my wife and I left in November for a tour of the Orient, including Taiwan. I had written *H. Y. Lo* and *M. C. Chan* and when we arrived in Taipei they were waiting to see us. Both looked well and healthy and greatly interested in news of various members of the Class. Lo is head of the Department of Mining and Metallurgical Engineering at Cheng Kung University at Tainan. Chan formerly was engaged in engineering work in Hong Kong, but recently came to Taipei, where he now prepares a daily abstract of the Chinese press for the U.S. Armed Services and Diplomatic Corps. It was truly a heartwarming experience to see these Classmates again after forty years and to hear of their help in Taiwan's heroic effort to build a country. An exotic and delicious Cantonese dinner, including rice wine, bourbon, Scotch and a somewhat off-key 'It's always fair weather' completed the visit. Sincerely, Jim Offutt."

After our recent December write up devoted to *Don Green* he wrote us an acknowledgement and brought us up to date on his activities. "I am continuing to enjoy retirement from business. Jane and I took a trip to, of all places, Libya in the spring to see her sister whose husband is stationed there. We had fantastic trip in to the desert to see the oil wells. Spent two delightful weeks in Spain on the way back."

A couple of address changes recently came through indicating that they probably are retirement addresses: *Dudley L. Parsons*, General Delivery, Green Valley, Ariz. 85614; *Samuel W. J. Welch*, Route 1, Box 941, Inerarity Point, Pensacola, Fla. 32507 and Col. *David B. Powers*, 339 Concorda Drive, Tempe, Ariz. 85281. The class now has quite a colony in Arizona—almost worth a visit by the class secretary when he retires. Bill Millar seemed to start it all when he settled in Patagonia. Now in addition to those already mentioned we have *Bill Baker* in Phoenix and *Bill Wraith* in Tucson—enough to organize a '26 picnic. On the map it appears that no one would have to drive more than 50 to 60 miles if there is any place suitable between Tucson and Phoenix. *Dave Powers* seems a good one to organize it since he made the effort to come east to our last reunion. Have it in May and perhaps I'll join you!

Every year the "Dave" Harrison Xmas card looks more and more like the Sun-

day *New York Times*. Its a full report on the family which now numbers 19 and it is beautifully done. An excerpt brings us up to date on Dave. "This past summer Crockett brought to a satisfactory conclusion a project undertaken in August 1961—he sold his interest in Satec. After the sale, a negotiation that he started in June of 1964, was completed it brought about the combination of Satec with the testing machines business of the Wiedmann Division of the Warner & Swasey Co. While Crockett was pleased to bring it to a happy ending he does not regret having undertaken the project. Each month since July Crockett has been spending less time at Satec. He expects to be completely retired by the end of the current year. So far there has been no problem in keeping busy on various projects. He is thoroughly enjoying himself and there are many more interesting things to be undertaken." This is more of an achievement than appears on the surface. "Dave" left the company with which he had spent his life a little over ten years ago and started all over again. To do this, and succeed, is a real challenge and the satisfaction accompanying this success must be great.

A post card from Granada, Spain and signed by *Willard Vaughn* indicated that another retired '26 man is doing a bit of traveling. "Dear Smitty, We drove from Granada to Madrid today, about 250 miles. Its the only way to see the country; by bus. We have been enjoying it greatly—Lisbon, Seville, Tangiers and Torromolinas, which is . . . something like Miami Beach. Washington Irving did a lot for Spain writing Alhambra and he got them to drive the gypsies out of the old places. They are living in caves on the hill side."

The Alumni address for *Bill Forrester* indicates that he's not worrying whether he can wash the car before the temperature drops to zero and the heavens drop a couple of feet of snow: *William A. Forrester, Jr., Box 955, Lahaina Mani, Hawaii. Nice going, Bill.*

Our final notice from the Alumni Register indicates that on October 30th we lost another classmate, *Herbert T. Creedon*, of New Canaan, Conn. We have no details but we express the sympathy of the Class to Herb's family. As we close this issue we ask that you write us about your retirement plans. We are particularly interested in planned activities—things that you have wanted to do for years and now achieving. Traveling seems to be the most prevalent activity but there must be a great many others. So until April—Cheerio!—*George W. Smith*, Secretary, Pigeon Cove, Mass. 01966

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Professor *Frederick S. Erdman* died in Ithaca, N.Y., last September. He had retired from a career of 31 years at Cornell University in June 1967. Fred attended Princeton University before entering M.I.T. his junior year and after

graduation went first to Worthington Pump and then to teach at Roberts College in Istanbul, Turkey. After eight years, he returned to this country to teach and complete his M.M.E. and Ph.D. degrees at Cornell, where he was made a full professor in 1949. At the time of his retirement he was associate dean of the graduate school's fellowship program. On sabbatical in 1949, he had studied the role of atomic energy in power generation. He was the author of numerous periodical articles, and of a section on food preservation by freezing, in the *Encyclopedia Britannica*.

George W. Jacobs died July 29, 1968 in Greencastle, Penn., his retirement home. Before and during World War II, he was a project engineer in the development of instrument landing systems for aircraft. After the war, he was a senior engineer on microwave research at the Federal Telecommunications Laboratories, Inc., in Newark, N.J., a subsidiary of IT&T.

Was happy to receive a Christmas card from *C. C. Smith* in which he told of being in the United Kingdom for six weeks in 1968. He did not mention any business but said he drove 1,600 miles to master a right-hand-drive Ford. . . . *Anson Rosenthal* was the guiding spirit of the annual cocktail party of New York's Technology Club, held at the Chemists' Club last fall. . . . Twenty-five years ago, *Bud Gillies* was Vice President of Grumman Aircraft, *Jack Herlihy* was Vice President of United Airlines, *Ralph Johnson* was Personnel Manager of Hawaiian Electric, and *Tom Knowles* was Vice President, Goodyear Aircraft.—*Joseph S. Harris*, Secretary, Box 654 Masons Island, Mystic, Conn. 06355

28

The easiest route I know for a lazy secretary to approach his class notes is to quote a complete letter, this one from genial *Abe Woolf*: "Just the other day, a gift package arrived at my office from the M.I.T. Class of '28. It included a silver tray with the following inscription: 'M.I.T. '28, Abe Woolf, 40th Reunion Chairman.' I hope that you can include this note in the *Technology Review* so that I can express my thanks to the entire Class for this gracious memento which Ruth and I will always cherish and keep.

"All our class reunions in the past have been great, but being the Chairman of the 40th was an experience I shall never forget. To the entire Reunion Committee and particularly to my Co-Chairman, *Florence Joep*, I extend my thanks again. With best wishes and good health to all."

That was so easy we might as well publish a recent letter from *Iky*: "I wish to send you my New Year's greetings, and to thank you all again for the wonderful 40th Reunion, which I cannot help remembering in every way of the daily

life. Professor *Secor D. Browne* has informed me of his joy to receive a silver tray from the M.I.T. Class of 1928. I want to thank you for your part in expressing the grateful thoughts of the Class to Professor Browne. It may be mentioned that I exchange letters with Professor Browne quite often and sometimes in Japanese. As you know, he is a remarkable linguist. I hope that you and your family are well and I wish you all the best in the year of 1969."

A President

From the *Caldwell, N.J. Progress* we learn that *Roberta (Lovely) Halligan*, health officer and registrar of vital statistics for Caldwell, was installed as president of the N.J. Health Officers Association. Roberta has been Caldwell health officer since 1958 and is a past President and secretary for the Essex County Health Officers. Last May she was installed as governor of District Two of Altrusa International, a women's organization. We note from the clipping that she is a member of many business and professional women's clubs of Montclair and Essex County. Besides her many official interests, Roberta is an ardent bowler, stamp collector and horticulturist. She lives with her husband at 36 Passaic Ave., Roseland, N.J.

Distinguished service

From the September 1968 issue of a publication of the National Council of Engineering Examiners we learn that *Jim McCarthy*, Course I, of South Bend, Ind., long time professor of civil engineering at Notre Dame and a consulting engineer, was one of six engineers awarded distinguished service certificates by the national association. The award to Jim reads: "The award honors James A. McCarthy for outstanding and Faithful service to the engineering profession, to his state Board and to the National Council of Engineering Examiners. He has rendered outstanding service to the National Council on standing committees for Qualifications for Registration, National Bureau of Engineering Registration, Engineering Education Requirements and Public Information. During his sixteen years as a member of the Indiana State Board he has also served on several committees of the Central zone and from 1962 to 1964 he was a Director of the National Council of Engineering Examiners."

Honorary Fellow

A news release from the American Institute of Aeronautics and Astronautics presents a list of honorary A.I.A.A. fellows and naturally the name of our prominent classmate *John Stack* was listed along with seven other M.I.T. graduates. So eight out of 23 honorary fellows residing in the U.S. are M.I.T. men.

We learn with interest that *Richard Davidson* retired November 1 as investment vice president of Boston Old Colony Insurance Co. He joined Old Colony in 1942 and climbed the ladder rapidly until he was finally appointed in-

vestment vice president in 1957. . . . A note from *Henry Harrington* seeks information about '28 people in Australia, New Zealand, and South Africa to visit on a business trip in February. Sorry we couldn't help him. . . . *Al Pearsall* writes on his alumni fund envelope that he is still teaching advanced junior and senior math at the Rome Free Academy. He proudly boasts of three daughters, five granddaughters, three grandsons and two sons-in-law. And *W. Grier Armstrong* reports that he is still working for the DuPont Co., on pigments and coatings as a research associate. He expects to retire in about two years.

Jim Donovan sent me a pile of Christmas cards he received. Almost everyone compliments our president and chairman and the reunion committee on an excellent 40th reunion. . . . *Ernie Knight* sends a photograph of a bit of Maine lake shore and adds, "Our pot of gold at the end of the rainbow on Panther Pond. Hope you have returned to normalcy after the reunion." . . . A card from *George* and *Peggy Mangurian* notes that he hopes to be retired and living on Cape Cod by the time of our next reunion. He also states that he plans to go to Europe for five weeks in the spring. . . . A long note on a card from *Olive* and *Vic Decorte* tells us that they have been very busy since they returned to Rome early in September after an absence of four months. They plan a long trip to Mozambique and South Africa. They will sail from Brindisi on January 11 and will return on March 24 in time to struggle with their U.S. income tax. They send their regards to all their classmates.

Kent and *Marge Hough*, after a long flattering introduction, say, "We hope that our 45th will be down on the shore. As exiles from the New England area, we miss the ocean and the beaches, although even here (Ithaca, N.Y. we do have other types of scenery. . . . *Ruth* and *Chris Case* say they are still talking about that wonderful reunion last June. They send their best to everyone in the class. . . . In that delightful and carefree scroll that could only have been written by *Anne*, the *George Palos* report that the reunion was wonderful "to say nothing of our getting that first citation—but, of course, we always knew we were superb. Our trip to Russia for the World Energy Conference was fascinating but strenuous. England for two weeks after was a joy. We could talk—can you picture me restraining myself for two weeks?"

John Houpis sends his greetings from Athens, Greece and plans to be back in the good old U.S.A. by next June or July. . . . *Max* and *Mary Parshall* were in Joliet, Illinois for Christmas and went back to work in January through June. They hope to make a tour of Alaska during the summer—as though Colorado isn't cool enough. . . . There are dozens and dozens more of cards, and we hope to quote from them in the next few issues of the *Review*.

In the meanwhile it is our sad duty to report the death of *William G. Loomis*, of Bemus Point, New York. Bill was Course XV, and he died on November 11, 1968, after an illness of only one week. He was with the Continental Can Company for several years until his retirement in 1960 when he became owner of the Jamestown Seven-Up Bottling Co. He was also recently associated with the Arnot Division of Royal Metal Corp. Surviving are his wife, a daughter, two sons and three grandchildren.—*Herman S. Swartz*, Construction Publishing Co., Inc., 27 Muzzey St., Lexington, Mass. 02173

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It was a blustery white Christmas in New Hampshire this year, but our star reporter, wandering *Wally Gale*, wasn't in Melvin Village to see it. From the Safari Club in Kenya he contributes: "Recalling the '29 Class Notes a year ago, we tried to get in touch with *George Meyers* when we were in Kampala (Uganda, East Africa) last week. Found he had returned to U.S.A.—so will have to catch him at the Reunion in June. We are spending Christmas here on the equator, resting after 16 days in Uganda and Tanzania. We raised our lion count by only two over last year (79 from 77) but added lots of hippos and crocs in the Victoria Nile (shooting with a \$17 camera, not guns!). Will be home by March 1." Just in time to read this issue, *Wally*. Thanks for the beautiful postcard of Mount Kenya and the news.

Virgil McDaniel was good enough to send us an article on *J. R. "Russ" Clark*, who is a vice president of LTV Aerospace and general manager of the Vought Aeronautics Division. Russ has been designing Vought Navy fighter planes from the F-4U Corsair of World War II fame to the supersonic F-8 currently being used in Viet Nam.

The September 1968 issue of *Interiors Magazine* told the success story of *J. Gordon Carr & Associates*, a New York architectural firm specializing in the planning and design of commercial interiors, established in 1937 as a one-man office. Gordon's company now employs over forty designer-architects, is regarded as a pioneer in its profession, and has a most impressive list of clients (such as *Tiffany & Company*; *Merrill Lynch*, *Pierce, Fenner & Smith*; *General Motors* and *Bristol-Myers Company*). Congratulations, *Gordon*.

Elmer Skonberg donned the academic regalia on November 18, when he represented M.I.T. at the Inauguration of the President at the University of Louisville, Kentucky.

C. Fayette Taylor, Professor of Automotive Engineering, Emeritus, at M.I.T., sent us the following information: "For the month of August 1968 I was awarded a Fulbright grant (my third) to lecture

in Sao Paulo, Brazil, under the auspices of the 'Instituto Maua de Tecnologia' on the subject of the design of internal-combustion engines. At the end of this course of lectures, by vote of the Corporation of the 'Instituto' I was appointed a 'professor, *honoris causa*,' of that institute." Congratulations, Professor!

In October, *Morris Smith* sent a short note: "Still with Apollo; did you see Apollo 7?" Sure did, and Apollo 8, too. Mighty proud to know '29ers are participating in this great achievement! . . . *Morgan Collins* writes from Ann Arbor, Mich., that he is still Professor of Business Administration at the University of Michigan. . . . News from Professor *John Happel* informs us that he and his wife were in Russia last June, in conjunction with the exchange program of the Soviet and U.S. Academies of Science. He visited a number of scientists and gave a paper at the 4th International Congress on Catalysis in Moscow. . . . *George Logan* is enjoying high-rise living in his new apartment on the 26th floor with a magnificent view of Philadelphia. George is Assistant to the President of Philadelphia Electric Company which he considers a "fascinating job." He also brings news of *Don Funk* whom he sees nearly every day as each is enroute to work. Don is a Vice President for the John Wanamaker Store and is busy building suburban stores. Thanks, *George*, for the nice Christmas card and for the news.

Classmates deceased

We sadly note the deaths of *Clarence C. T. Loo* of Honolulu, Hawaii, on May 26, 1968; and *Robert R. Phillippe* of Alexandria, Va., on June 29, 1968. Also, sincerest sympathy to Mrs. H. F. Dean of Middlebury, Vt.; Harold died August 2, 1968.

I attended a 40th Reunion Committee meeting last week and must report that the committee is working very hard to make our reunion a very special one this year. Your attendance will help make it a great success, so hope you are planning on June 13, 14, 15 at Wianno, too. Best regards.—*John P. Rich*, Secretary, P.O. Box 503, Nashua, N.H. 03060

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The No. 1 item this month is that active planning for the 40th reunion has now started. *Dick Wilson* writes that *Jack Latham* has agreed to act as chairman of the reunion committee. As of this writing *Dick* is carrying on discussions with the Chatham Bars Inn and the Wianno Club, both of which are on the Cape. A final decision as to location should be forthcoming in the near future.

Preserving historic textiles

As previously reported, *Jim Rice*, after retiring from the regular army as a colonel in 1945, became interested in the problems of cleaning and preserving

old and valuable textile fabrics and rugs and does research and consulting work in this field. Much of his work is concerned with textiles having historic significance. During the past year he has worked on the conservation of garments worn by President Lincoln at the time of his assassination, as well as to several revolutionary war flags. The Rices now have nine grandchildren.

Bob Reynolds has acquired two houses in addition to the home base in Winchester, Mass. One of the new homes is on the Bumps River in Centerville (Cape Cod), Mass. The other is at Ocean Ridge between Del Ray and Palm Beach, Fla., "just across the street from the ocean and on the Intercoastal." As many of you know, Bob is president and treasurer of the Reynolds & Foster advertising agency. He says his golf isn't good enough yet to consider retiring. Bob's son, Robert Jr., works for the Dewey & Almy Division of W. R. Grace & Co., in the Marketing Department and his daughter, Marjorie, writes for the Fairchild publication *Home Furnishings* under her own by-line.

Ernie Reisner works for the Small Business Administration as Chief of the Industrial Support Services Division. His work involves evaluation of the qualifications of small firms for handling government contracts. He is a director of the M.I.T. Club of Washington. . . . **William R. Jackson** was recently re-elected treasurer and a director of the American Institute of Steel Construction. . . . **Joan Kresser** has received the Westinghouse Electric Corporation's 1968 District Engineer Award for "outstanding engineering performance." The award was made by a Westinghouse vice president, Electric Utility Group at a meeting in Pittsburgh. . . . **C. Haskell Small**, who has been Alumni Fund Chairman in Washington for several years, has taken on a number of additional extra-curricula jobs, namely, President of the Board of Directors for the Pilot School for the Blind, Executive Vice President of the Metropolitan U.S.O. and member of the National Council of the U.S.O.

Joseph R. Stevens has retired as President and Chairman of the Board of

J. T. Baker Chemical Co., and has accepted an assignment with the International Executive Service Corps to serve as a volunteer executive in Taiwan with Kingdom Pharmaceutical Co. Ltd. Kingdom asked I.E.S.C. to locate an executive experienced in pharmaceutical chemical manufacturing to help the company establish the manufacture of certain drugs. Joe and his daughter Ellen left in December for a six-month stay in Taiwan.

As previously reported, Frank Hankins retired from Lockheed Aircraft Service Co., about two years ago. He says that he is "enjoying the challenge of so many things to do, especially on this 10 acres of mine. Put in a swimming pool this past summer and don't really expect to get all the destroyed area back in shape." The Hankins older son is studying for a Ph.D. at the University of California and their younger son is a naval aviator presently in Japan.

Supplementing last month's report on *Dave Wells'* death, Jean has been kind enough to send me further details about the Wells family and Dave's activities. There are five Wells children: Roger, David Jr., Jean, Rebecca and Mary. Both boys went to M.I.T. "They were both brainwashed but have not regretted it." Roger graduated in Naval Architecture in 1967 and Dave Jr., is an economics major in the class of '69. Dave Sr., was president and treasurer of Wells & Wells, general contractors in St. Louis. He was a board member of the Health and Welfare Council, the Newman Foundation, the Friends of St. Louis University Library and president of the Playgoers. His main hobby for the last few years was an etching collection.

Changes of address

John B. Osborne, 489 Fairmount Ave., Chatham, N.J. 07928; **W. Howard Reed, Jr.**, 2812 S.E. 18th St., Cape Coral, Fla. 33904.—**Gordon K. Lister**, Secretary, 530 Fifth Avenue, New York, N.Y. 10036

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Randy Binner tells me that after 17 years in the Chicago area, he has been transferred back to New York and is

now living in New Canaan so as to be convenient to the Nutmeg Curling Club. He doesn't seem to like commuting on the New Haven (now Penn-Central) any more than the rest of us. . . . A welcome note from *Glenn Goodhand* mentions that he retired from active army as a Brigadier General in June 1964. Most of Glenn's army career was devoted to the development of Army aviation, in which he achieved his Master Aviator rating in both fixed and rotary wing aircraft. He is now in the helicopter business as the Washington representative of the Vertol Division of the Boeing Company at 1625 K Street, Washington, D.C.

Mayer Hyman, who went on to earn his M.D., writes, "I have been practicing internal medicine in Tucson since 1946. After having served my terms as Chief of Staff of Tucson Medical Center, Governor of the American College of Cardiology for the state of Arizona and a member of the Board of Directors of several voluntary health organizations, I am about to complete my duties as a member of the Board of Directors of the Arizona Blue Cross and the Board of Directors of my local County Medical Society. I look forward to a period of "post-influenza asthenia"! I haven't attended a class reunion since graduation but I have promised myself a trip East in 1971." (We'll look forward to seeing you then, Mayer.)

My old thesis partner, *Fred Stanley* writes from Florida that he has retired from "Plastics" and spends his winters in Florida and summers on Long Island. Fred says that he has been captain of a private yacht for the past two summers and may take a boat to the Bahamas next summer for a couple of months. Fred seems to be leading a very pleasant life. . . . A most welcome note from *Bill Stellrecht* in Stuttgart tells that his two daughters have been married since we met last; the first daughter married a partner of Bill's (Herr Haecker) and the second daughter married an ethnologist in Frankfurt and is still taking studies in the same field. Bill's third daughter is still in school and Bill writes that he hopes she finishes her studies within the next two years before getting "tied up."



Congratulations to *John W. Smith* upon his elevation to the position of Assistant Treasurer Finance of the Maine Medical Center and to *Don Holden* on his election as a Director of Tenneco Inc. Congratulations, also, to *Don Sinclair* whose company, General Radio, was awarded the President's "E" for excellence in exporting. Congratulations to *Warren Dickinson* upon his appointment as Vice President of research and technology by Douglas Aircraft Co., division of McDonnell Corporation and also to *Gordon Brown* upon his election as director of Gillette Company.

Classmate deceased

Our deepest sympathy to *Bill Cranford's* family. Bill, who was executive vice president and general manager of Seeman Printing Co., died Christmas morning of viral pneumonia. Speaking of Bill, an editorial in the Durham (N.C.) *Morning Herald* said: "Printing to William E. Cranford, whose unexpected death Christmas Day came as a shock to Durham, was more than a business; it was an art. As he saw it, printing's function is not simply to communicate, but also to communicate in the most attractive fashion. . . . Affable in personality, pleasant to deal with, courteous, he radiated a charm which made association with him a highly agreeable experience. . . . Bill Cranford's death in his prime cuts short a career of great usefulness to this community."

Hope you all have kept well through the winter and avoided the Hong Kong flu.—*Edwin S. Worden*, Secretary, 35 Minute Man Hill, Westport, Conn. 06880

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Children and grandchildren are uppermost in the thoughts of many correspondents this month. *Robert S. Prescott* writes that both of his sons are now married: Theodore has a fellowship at the Rinehart School of Design in Baltimore and his wife teaches school; Robert, the oldest, is living in Rochester and his wife is also a school teacher. . . . *Francis Gowen* has four children: Helen, graduate of Northeastern University, '65, now married with two children; Philip, graduate in architecture,

Rhode Island School of Design, '68, studied in Rome his senior year and is now in the Peace Corps in Botswana, South Africa; Nancy, a graduate of the University of Massachusetts, '68, touring Europe when last heard from, was teaching English in Crete; Bruce is a sophomore at Centre College, Kentucky. Francis has been with Raytheon for 26 years and is now in Contracts at Submarine Signal Division, Portsmouth, Rhode Island.

Roger J. Zampell's son, Roger, Jr., is now a 3rd year student at Georgia Tech School of Architecture and doing fine. Having reached the age of 60, Roger, Sr., is now on the payroll of Uncle Sam as "LTC AUS Retired Army," and he hopes to retire from his present civil job in July 1969. . . . *Frederick W. Green* has two of his children living in the Boston area and so has a good excuse to visit the area and take advantage of the seminars at M.I.T. the latest one was much enjoyed. . . . *Charles T. Thayer* has an oldest granddaughter of ten-and-one-half years and a sixth grandchild born October 17, 1968. Charles is president of the Kennett Square (Penn.) Rotary Club this year. . . . Col.

Arthur L. MacKusick writes that he is retired, for the moment anyway, in the warm Florida sunshine, but is so busy with civic activities, personal affairs, golf and boating, that he may have to go back to work to rest up. He reminds us that he is still married to that wonderful girl who typed his and Jim Robson's joint thesis.

James A. Beam sends me a unique business card from 120 E. Chestnut St., Mt. Vernon, Ohio, affirming his occupation to be "Collector of Friends, Clocks, and Old Tools." On the reverse side, however, he gives away the fact that he is President of Kokosing Realty Co., owner of the Millstone Cabinet Shop, Director of the Ohio Central Telephone Co., and U.S. Ceramic Tile Co., as well as Vice President of the First Federal Savings and Loan. I have to leave out the most interesting part—all the civic organizations of which he is an officer or member—would you believe twenty-one including Curator of the Old Tool Crib Museum?

Dr. Samuel E. Paul, M.D., favors me with reprints of two of his papers: "Reading Problems in Children" from the *Academic Therapy Quarterly* and "The Psychosomatic Riddle of Statistical Surveys" from *Psychosomatics*, and references to another on "The Pattern of General Practice" published in the German medical literature. Dr. Paul is school physician and a general practitioner in Troy, N.H. and has had a sustained interest in reading disability. . . . Reverend *Winthrop E. Robinson* encloses literature from his church in Minneapolis, Minn., and I conclude that he has found peace and satisfaction in his work. . . . *Robert E. Minot* is co-author with Richard Wills and Warren Rohter of a new book dedicated to the late Royal Barry Wills, M.I.T., 1917. *More Houses for Good Living* is a book of photographs showing architectural commissions by their firm. Robert is architect and senior partner in the firm of Royal Barry Wills.

Alfred A. Mulliken has been elevated to Executive Director of the Chemical Specialties Manufacturers Association where he has served as secretary. The new title reflects the expanding scope of the Association and the increased responsibilities of the chief employed official of the organization. Alfred started with the Association in 1955 and has been their official representative at many national and international meetings of allied organizations. The Mullikens live at 120 Nyac Avenue, Pelham, New York.

A fond reminiscence from *Norman T. Wilson* about Professor Norbert Weiner: "He came with his father and sister to our summer home in Hebron-Plymouth, N.H., and I remember he said he was the youngest Ph.D. ever to graduate from Harvard. He asked for summer work and mother put him to work in the vegetable garden where he pulled out all the vegetables and left all the weeds."

Kenneth W. Smith writes that "during the past year I have written to and had a reply from Horace Sayford Ford, whom the Class remembers as our Bursar and a very helpful friend and highly respected man. He was 84 in January

FIFTH ANNUAL TOUR PROGRAM—1969

This unique program of tours is offered to alumni of Harvard, Yale, Princeton and M.I.T. and their families. The tours are based on special reduced air fares which offer savings of hundreds of dollars on air travel. The tour to India, for example, is based on a special fare, available only to groups and only in conjunction with a tour, which is almost \$400 less than the regular air fare. Special rates have also been obtained from hotels and sightseeing companies. Air travel is on regularly scheduled jet flights of major airlines.

The tour program covers four areas where those who might otherwise prefer to travel independently will find it advantageous to travel with a group. The itineraries have been carefully constructed to combine the freedom of individual travel with the convenience and saving of group travel. There is an avoidance of regimentation and an emphasis on leisure time, while a comprehensive program of sightseeing ensures a visit to all major points of interest. Hotel reservations are made as much as a year and a half in advance to ensure the finest in accommodations.

THE ORIENT

30 DAYS \$1569

Mar. 22, Jun. 28, Jul. 26, Sept. 20

1969 will make the fifth consecutive year of operation for this fine tour, which offers the true highlights of the Orient at a sensible and realistic pace. Eleven days will be spent in JAPAN, divided between TOKYO, the ancient "classical" city of KYOTO, and the FUJI-HAKONE NATIONAL PARK, with excursions to NARA and NIKKO. Five days will be spent in HONG KONG and four in the fascinating city of BANGKOK. Shorter visits to SINGAPORE and the lovely island of FORMOSA complete the itinerary. Optional pre and post tour stops may be made in HONOLULU and the WEST COAST at no additional air fare.

A complete program of sightseeing will include all major points of scenic, cultural and historic interest. Features range from a tour of the canals and floating markets of Bangkok, an authentic Javanese "Rijst-tafel" in Singapore, and a launch tour of Hong Kong harbor at sunset, to a "Mongolian Barbecue" in Taipei, and a trip on the ultra-modern 125 m.p.h. express trains of Japan.

Tour dates have been chosen to coincide with outstanding seasonal attractions in Japan, such as the spring cherry blossoms, and beautiful autumn leaves, and some of the greatest annual festivals in the Far East. Total cost is \$1569 from California, \$1739 from Chicago, \$1807 from New York. Special rates from other cities.

INDIA

Including NEPAL and PERSIA

29 DAYS \$1636

Mar. 15, Mar. 22, Aug. 2, Oct. 4

An unusual opportunity to see the diverse and fascinating subcontinent of



India, together with the once-forbidden kingdom of Nepal and the rarely-seen splendors of ancient Persia. Here is India from the mighty Himalayas to the palm-fringed Bay of Bengal: the great seaport of BOMBAY; the magnificent cave temples of AJANTA and ELLORA, whose thousand year old frescoes are among the outstanding achievements of Indian art; MADRAS, in the south; the great industrial city of CALCUTTA; a thrilling flight into the Himalayas to KATHMANDU, capital of NEPAL, where ancient palaces and temples abound in a land still relatively untouched by modern civilization; the holy city of BENARES on the sacred River Ganges; AGRA, with not only the Taj Mahal, but many other celebrated monuments of the Moghul period such as the Agra Fort and the fabulous deserted city of Fatehpur Sikri; the walled "pink city" of JAIPUR with an elephant ride at nearby Amber Fort; the unique "lake city" of UDAIPUR, with its delicate white marble palaces; the great capital of NEW DELHI; and the fabled beauty of the VALE OF KASHMIR, surrounded by the snow-clad Himalayas. PERSIA (Iran) includes visits to PERSEPOLIS, the great royal capital of Darius and Xerxes in the 5th century B.C.; and ISHFAHAN, the fabled city of the 15th-17th century Persian Renaissance, with its palaces, gardens, bazaar, and famous tiled mosques. Outstanding accommodations include hotels that once were palaces of Maharajas and luxurious houseboats on Dal Lake in Kashmir. Total cost is \$1636 from New York.

SOUTH AMERICA

31 DAYS \$1599

Jan. 18, Jul. 26, Oct. 18

An original itinerary which takes unusually full advantage of South America's great scenic and cultural attractions. The trip descends along the West Coast, dominated by the towering Andes and filled with the churches and mansions of 16th and 17th century Spain, and returns through the modern cities and lush scenery of the East Coast. Stops include Spanish colonial QUITO, with the nearby Indian market at AMBATO and a drive along the snow-capped peaks of "VOLCANO ALLEY"; Pizarro's great viceregal capital of LIMA; the ancient city of CUZCO and the fabulous "lost city" of MACHU PICCHU; lovely SANTIAGO in Chile; cosmopolitan BUENOS AIRES, the continent's largest city; BARILOCHE, in the beautiful ARGENTINE LAKE DISTRICT; spectacular IGUAZU FALLS (largest in the world); the sun-drenched beaches of RIO DE JANEIRO (considered by many the most beautiful city in

the world); the quaint and historic town of OURO PRETO (so revered by Brazilians that the entire town is preserved by law as a national museum); the striking contemporary architecture of BRASILIA; and PANAMA CITY with the Panama Canal, Spanish ruins, and free-port shopping. These great points of interest are complemented by an assemblage of South America's truly outstanding hotels. Total cost is \$1599 from New York. Special rates from other cities.

EAST AFRICA

22 DAYS \$1549

Jul. 14, Jul. 28, Sept. 22

A luxury "safari" to the great national parks and game reserves of Uganda, Kenya and Tanzania. These offer a unique combination of magnificent wildlife and breathtaking natural scenery: great herds of elephant in QUEEN ELIZABETH PARK, in the shadow of the fabled "Mountains of the Moon"; a launch trip on the White Nile through hippo and crocodile to the base of the thundering MURCHISON FALLS; multitudes of lion and other plains game in the famous SERENGETI PLAINS and the MASAI-MARA RESERVE; the spectacular concentration of animal life in the NGORONGORO CRATER; tree-climbing lions around the shores of LAKE MANYARA; and the AMBOSELI RESERVE, where all types of big game can be photographed against the towering backdrop of snow-clad Mt. Kilimanjaro. Air travel is used where possible, enabling longer stays within the parks. Also seen are the fascinating capital cities of KAMPALA, NAIROBI and DAR ES SALAAM, the exotic "spice island" of ZANZIBAR, and the historic MOMBASA, a beach resort on the Indian Ocean, with its colorful Arab quarter and great 16th century Portuguese fort. Tour dates have been chosen for dry seasons, when game viewing is at its best. The altitude of most areas provides an unusually stimulating climate, with bright days and crisp evenings (frequently around a campfire). Accommodations range from luxury hotels in modern cities to surprisingly comfortable lodges in the national parks (some equipped even with swimming pools). Total cost from New York is \$1549.

Rates include Jet Air, Deluxe Hotels, Meals, Sightseeing, Transfers, Tips and Taxes. Individual brochures are available on each tour.

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Colonel Carroll T. Newton, '33, and his Frances on the front steps at Warren Henderson's Fort Rock Farm last summer.

1969, is apparently in good health and is living at 100 Memorial Drive, Cambridge, Mass., and I am sure would get a big lift from anyone who would drop him a note or pay him a call."—*Elwood W. Schafer*, Secretary, Room 13-2145, M.I.T.; *James Harper*, Assistant Secretary, 2700 South Grant Street, Arlington, Va.

33

I must, first of all, apologize to our mutual friend, *Russell Eddy*, for not including the list of the faithful who attended the November Alumni Seminar; a list which I promised in the January issue, and then forgot. Here it is, and each man is entitled to drop me a line thanking me for the mention (a few will): Mr. and Mrs. *William A. Andrews*, *Arra S. Avakian*, *Donald W. Brookfield*, Mr. and Mrs. *G. Russell Eddy*, Mr. and Mrs. *William B. Klee*, Mr. and Mrs. *Edward D. Rohn*, Mr. and Mrs. *W. Dorwin Teague*, Mr. and Mrs. *James W. Vicary*, and last but surely not least, *Clarence Westaway*, the only Class Officer that made it. If anyone has been left out, a full page letter to me will get his name in the next issue (full page that is). Only incidentally, *Ed Rohn* and his good wife came all the way from California for the event. I do wish that I had a longer day, and week, so that I, too, could take in everything. I have the addresses of all mentioned above, so that if any name strikes a familiar chord, just drop me a half-page note, and you get an address, and a mention for writing. So, thanks, Russ, and your lady. I did enjoy both of you, was it not November 8 at the farm?

Complacent alumni

What an extra thrill it was to get the next two letters from friends of so many years that it is positively shameful; *William (Bill) Harper*, and *Ellery Clark*. Bill is our Foreign Office man from Galveston Bay, or someplace. Bill sends little news outside of his great sorrow in not being able to get away to attend the 35th. Bill goes on to relate a few of his troubles as President of the Texas College of Chiropractic, Seabrook, or Pasadena, TEXAS. Too bad; here is a College President who says his school is short of funds. Now ain't that a bit of

wisdom for the book? However, Wille goes on to what I choose to call a "Classic" when he says, and I do quote, "... we are not alone, as I read your stuff, as the complacency of our Alumni scares me, I wonder if I will wind up paying my own salary." Was it not the Good Book that had it, "Out of the mouths of babes and suck(ers)lings cometh. . ." William, you are indeed a marvel, and I will hasten to tell Ken Brock how complacent your Alumni turned out to be. Just to make with the reminiscence, when do I hear from *Frank Amadon*, *Steve Crick*, *C. Al Moeller*, and many others with whom I was real buddy bud years ago? Never!! Complacent, sez this guy. Egad, he says they are complacent. Well, one never knows. Bill, please remember that you are doing a lot of good, and you are appreciated by someone, if only Bobby, so there. Thanks a million, and next time let me in on your recreations, the travels if any, hobbies, if only a few, family life, arrests, convictions et al.

A month's notice required

Now, the other one is from *Ellery Clark*, stress man, and designer of Apollos extraordinary. I get two pages, hand written, from a post card asking this guy why he moved, as evidenced by the change of address notice. So all class secretaries please note; every once in a while someone does reply to reminding cards, especially top drawer chaps like Ellery. Ellery's address gave me a clue, as he now lives on Ocean Drive. There is little, if any, ocean in and around Sacramento. So, it appears that the fellow has left the Aerojet General Corp., and is with Harvey Aluminum, since August, as their Chief Research and Development Engineer in Charge of Stress, which is Ellery's middle name. So, after designing and stressing rocket motors for six years, "I am now . . . back working on ordnance material, and am in charge of design of a missile transporter-positioner for aircraft carriers, and aircraft automatic recoilless cannon." Brother, he left me way back there. Heck, I understood his language on rockets, but no more. His attempt at research appears to be in metals—the use of strong filaments for greatly increased strength, at present, boron filaments in aluminum matrixes; the end product is

stronger than most steels. Now for the family. Daughter Margie graduated from the U. of California last June and was married next day. Both she and her new husband are working in the Watts area of L.A. as school teachers. More power to them. I do hope they do some good, as we need some.

The Clarks are living in Torrance, a skip and a jump up the coast from Long Beach, where there is "no smog" and much surfing. Ellery is now entering as an apprentice in surfing. I cannot attend funerals on the West Coast unless I have a month's notice (the old coot surfing)! He tells me that he was in Pompano Beach last April (so was I, you ingrate), and now asks about water temperatures (ocean): a dang sight warmer than any California ocean water friend; 70-75 in winter, and warms up later (adv.). Ellery's fine little gal, Louise, was in the hospital September 1967, when I saw Ellery last (Class Officers Conference in San Francisco), but is now well, and doing better. I never did know what was wrong at the time, and it probably was none of my business. Ellery, I repeat, hearing from you and from Bill Harper gladdens this old heart no end. I do wish that some I could and did name, would do likewise. To both of you, thanks more than a million. Earlier, I mentioned going through Minneapolis-St. Paul, and phoned several classmates in the twin cities. One was *William (Bill) Niessen*, and no sooner than I got out of town he moved, bag and baggage to Marco Island, Fla. This paradise is 20 odd miles south, or downcoast, from Naples and you look that one up. I have not sent Bill the proverbial card, but, will. Cain't understand why he didn't move over here to live among the cliff dwellers. Bill, you can live here, right on the ocean, and so high up you hafta come down to see the water. More of Bill when he writes me.

Christmas gossip

I have a rather long, intimate Christmas letter from Catherine and *Wayne Taul*, of Fresno, Calif. This letter is mostly for the family, and very close friends, but, Catherine would not be the acceptable wife of Wayne if she could not find further use of the text by sending someone like me a copy, as, you may be

sure, the letter is just full of personal meat; gossip to you good gossipers. With me, the struggle is to cut out the relatives' section, and come up with the class news. You all will remember that Wayne came to us many year ago from West Point, took up with the fellows from Course I, Civils to y'all, and then took off for California. He did a bit of teaching at West Point during late WW II. Wayne is now a consultant, and does not conform to my usual definition, which means consulting as a form of retirement. He is really a consultant, in many forms of engineering. The Tauls are well, though Catherine has had a major operation and Wayne has a mild ticker pickup, occasionally, but is still strong and quite healthy. They still have the same three children, and no word of more through the letter, though there just might be another son. Cassie is moving to San Francisco and will live with two congenial schoolteachers, there. I take it that Cassie is teaching, too. Next daughter, Wendy, is to graduate in clinical psychology, and will practice in "Juvenile Hall." I quote because the information is incomplete, but remember that this letter is to the family. Fiancee Ray is making up his mind where to go for graduate work. Out our way, the college makes up the minds. Son John is about to graduate and will marry his Vicky in August. Because of Wayne's extensive travels, north in the state, the Tauls have purchased a house on one of the golf courses, in the Napa Valley, right smack on the 8th tee, north course, Silverado C. C. They mention a cottage at some lake, so this will make three homes to occupy. It can't be done, and that the Hendersons know from experience. Catherine, and Wayne, too, I just love getting such a nice Christmas card, and the long letter. You are very thoughtful of others, and your classmates will surely be pleased to hear about you. One item we might ask for, timidly; what schools did the youngsters attend, and what were their majors; also, the fiancées are a little obscure. Your brothers and sisters would not have to ask such questions, but, we really are interested, and how nice it is to hear from you.

While we are in the mood, Jack and Jermain Andrews come through with a similar letter, though they have done so before many times. The Jack Frost Andrews are now living in Lawrenceville N.J., where my grandson, Brenton Carey, goes to prep school; address upon request. The big event of the year was a cruise to the Caribbean by the whole family, as guests of Jermain's parents (the Johnson family, I assume). This was their 40th wedding anniversary. Golly, fly to Curacao, then cruise for a month in January. The Andrews also spent the month of August at Blackstone Lake, Ontario. Jack avers that he is still working, as he says that Jermain's Miss Mason's School is 5 miles one way from Lawrenceville, and his job at the New Jersey Dept. of Transportation is 5 miles the other way. Now, for the kids; Johnnie is out of Princeton High, worked at an aluminum plant during the summer, and

made some money for use at the University of Denver come (last) fall. Jamie is still at Wheelock, and spent her summer around northern California, but did not find work. Huh? Gail is in Special Coronary Nursing at Mass General and gets time off for some broadening travel. Y'all know what it broadens. In September, Gwen left her job as Secretary in the Governor's office in Boston, and took off on a trip with a friend, to cover Europe. Valerie worked at Martha's Vineyard as a hotel chambermaid during this last summer; a job that left plenty time for beaching and kindred pursuits. She is a soph at Beaver College and Jack visited her on Dad's day in October. Now, Jack went to a place where the Beaver was symbolic if nothing else, so what, if any, is the connection? Do they work like Beavers, or are they made to work like dogs? No answer is needed, or is there? For the statistically minded, Gail, nurse, is 24; Gwen, traveler is 22, and Valerie, Beaver, is 19. Johnnie must be 17 or 18 and Jamie 18 or 19. OK, Jack and Jermain, what did you say you were doing in June 1968? Many, many thanks, Jermain for doing all this work for Jack. I know that he appreciates it as I do. And Happy New Year to y'all.

I have a short one from Ellis Littmann, but you will hear more of him later. I just wish to mention that Ruth Hopkins (wife of Neil, of York) sent me a nice card, Christmas, and signed both of their names. Neil, the ingrate, didn't write a thing. Now, friends, I have still another Christmas letter, this from the Horace MacKechnies, Virginia. Horace is with that Defense Department that has to save its own budget to survive: they have survived for years now, so it is apparently sound. The real reason these good folks did not make the 35th was a spring trip to Great Britain. They flew B.O.A.C. to London and then really covered the whole island faithfully, though no mention was made of the Lake Country. Apparently the Macs are very much inclined musically, as they found time to take in Concerts in London and in Edinburgh. Daughter Joan is a senior in nursing at the University of Virginia. One trip taken by the family was for the purpose of Joan's interviewing at Mass General Hospital, as apparently Joan would like to join up with them after graduation. The whole family went on from Boston to tour Maine and the N.H. coast, going as far as the Acadia National Park, Maine. In spite of being so busy, Horace finds time to act as Deacon in the Mt. Vernon Presbyterian Church and headed the drive for funds with which to purchase a new Rogers Organ. He is also Treasurer of the local Civic Association. With little to go on (a family letter) I looked up Horace in "Goodridge" and found that he and Prudence have two daughters, so Joan must be the younger, and Prue, presumably married, is the elder, no? I can't seem to separate out the rest of the names, so will rely on Horace to fill me. Prue seems to be another Horace in that she is busy running things; Chairman of the Garden Department of the Woman's Club of Alexandria, Chairman of the

Conservation Section of the Riverside Woman's Club, in which capacity she headed a committee which set out over 1000 Loblolly Pine seedlings and 100 Cardinal Olive autumn shrubs. Further, she is Vocational Aide in the Guidance Program of the church, and also acts as Area Pastor of the church. Prudence, we love it all, and we love you all, except for maybe one little item; Exeter is only seven miles from the N.H. Turnpike. Again, we thank you kind folks for remembering us. And, my own personal thanks for the Christmas card.

Now, for the nonce, we come to the last but far from least; a nice personal letter from *Courtenay D. Marshall*, Chemical Engineer extraordinary, of Maxwell, Texas. Apparently my many short dissertations on the Mexico City M.I.T. Club Fiesta have begun to bear fruit, as Court and his good wife are interested enough to make inquiry as to how one goes about getting onto the mailing list et al. I have already been in touch with the Club, so can only repeat what I must tell Court if I ever get to writing him, direct. Most folks who are busy usually fly in to Mexico City, and the Club must know what flight, what day and time, as they meet everyone who is expected. So all the visitor has to do is get by customs, then look for a red and gray banner, which says "Tech is Hell," in capitals. After the greetings, the visitor is given a ride right to his hotel or wherever he is going, by an M.I.T. Alumnus, though not necessarily a classmate. The fellows do a bang up job all the way along, and I know that the Marshalls will love every bit of it.

Now comes a dandy, and the man surely is joking. He went to Houston a year or so ago, expecting to see *Cal Mohr*, as he says, among others, but he never did see him, Calvin, I mean, and Court knew that Cal was in town. Now for the punch line, "Do you suppose that there really is a Cal Mohr?" Well, friend, there surely is and one that does not see Cal is hiding somewhere himself, as Cal looks up, and/or phones more classmates than any one I know about. And, he knows more classmates than any two of us do. Yes, Court, there really is a Cal Mohr, and he is a top notcher.

Lest I forget, I wish here and now to thank every single one of you fine chaps who remembered me, and Leona, with a Christmas card. I did not count them, but, there were too many for me to acknowledge individually, so right here, we both thank you, ever so much. As you read this stuff, it might well seem an anti-climax, being March, but, as I write it is December 31, 1968, so there.

As an annual Christmas feature, we had the George and Lucy Henning card at the usual time, and again, a real masterpiece, one that shows plenty of thought, work, time, and love. This time pictures accompanied some of which I could pick out. To be brief, if at all possible, Helene is learning the interior decorating business from the ground up, while her hubby

is full time in the Army; Frances is a Junior at the New York School of Commerce of N.Y.U., and completed a summer course at same. It also appears that Helene and Edward enjoyed a second honeymoon aboard the S.S. *Panacea*, before Edward took off for Vietnam; one more beautiful girl, Janet, who graduated from Ethel Walker last June, and took the Byrnes Memorial Award for effort and achievement. Further, Janet was presented at the Junior League Debutante Cotillion, earlier. George and Lucy both attended the 35th. I got Lucy's picture (with another man) but did not get Georgie's. I will, no doubt!!

Always trying

A postcard to *Beau Whitton*, our southern Foreign Office man, gets me two copies of letters to other classmates in Beau's area, so Beau, as usual, is always trying. One was sent to *Edward L. Jones*, Course XI, Chief Engineer of Cone Mills Corp., of Greensboro, N.C. This try was productive, as Ed sent me an immediate answer (to Beau), about as follows: "Am in my 24th year as an engineer with Cone, and now Chief. Some recent projects have been 2,700 tons of plant air conditioning, and, (the building of) a large cloth warehouse, completely mechanized." Ed became a grandfather November 24, and a father-in-law for the second time, last August 9. He and Mrs. Jones are enjoying this growing family which now consists of a daughter, a granddaughter, a daughter-in-law, a son-in-law, and three sons. One daughter is a "gentleman farmer's" wife, two sons are studying for the ministry. The youngest and last son is a freshman in college and is very seriously considering becoming an M.D. Ed finishes by saying that this fine card full is the result of a letter request from Beau Whitton, which ought to tell me how lucky I am that Beau did the asking. Anyway, Ed, you did turn well, and I appreciate every syllable. No kidding, Ed, the boys, and girls, love gossip such as this.

The other note from Beau went to *Lennox (Len) Lindsay*, and, so far, was not and is not, too productive. Beau's comments, however, are printable, as he says he passes the secretary's card along to be filled in and mailed, so that he (Beau) can enjoy the reply in March. I do not believe that you will make it, Beau, as I am just now getting around to dropping Len the next set of hints. Beau continues, "I believe you told me that you have been in Hendersonville a number of years with the G.E. Lighting Plant, and that you are planning to retire shortly. Won't you tell us when that happens?" Good try, Beau, though you may well find that a lot of your esteemed classmates are dang poor repliers. Beau, my sincere thanks, and send me something on you and Daphne, one of these days. Not to fill in, of course, but just to continue with Cal Mohr's usual good news; a bit short this time, but with reason.

They had a card from *Charles (Chuck) Thumm*, who was too busy with the guest ranch to attend reunions in June. I must

drop Chuck a card, too. *Bob Smith* is even more brief, contributing his signature, but on what Cal did not say. I have accepted a signature many times with much joy, on checks and cards, too. Cal thanks me for contacting a cousin in Delray Beach and also an old Rochester pal living in Mexico City, last year. He has had no word from either except through me. Cal, I just had a letter returned from *Tom Shaughnessy*, so he is among the missing, too. It appears that the Filtration Society of England is meeting with his group in Chicago at the same time the Mexico City Club is having its Fiesta, though I shall attend only one, not filtration. It appears that these Englishmen will also attend the New Orleans Symposium, A.I.Ch.E., and Cal will too, so it is possible that a lot of the Texas Chemical Engineers, Course X, will also show up. The English will present several papers at this one, late in March. Cal, you will read this column before you leave for New Orleans, and if you wish any addresses, I will send them. Thanks again and best to you and Jean. I wish I had more Cals on my list, as then I could loaf longer and more often.

Only today (January 10) I have a short note from *Jim (James M.) Dunlap*, on the letterhead of the University City Public Schools, Office of Research and Testing. Jim, it says here, is Coordinator. This comes up on account of a visit I expect to make to Saint Louis next Saturday, January 11, at which time, I expect to visit with Classmates *Littmann*, *Payne*, *Sweeney*, and *Slick Henderson* (Elmer, that is), all these, complete with their lovely wives. We expect to have a short cocktail party, and a longer dinner hour, or was it vice versa? See the April *Review* for a running account of the meeting. Anyway, *Jim Dunlap* was included, but, he was in Fort Lauderdale (14 miles from me, and no phoning), and he and Betty cannot make the St. Louis extension of the 35th, as they have a previous engagement. Our Secretary of State for South Central, *Ellis C. Littmann*, is in charge of arrangements, like phoning these characters to get 'em out. Ellis says that it took no urging this time. Further, also through Ellis, comes word that Captain *T. Gorman Byrne*, U.S. Coast Guard, has retired, and has left St. Louis. Now, Captain T. G., it is up to you to let us know where you did go, and never mind why!!

With an acute shortage of press releases for this issue, we had thought that we would have to mail without any A'taull, but we were saved by the bell, when, with a letter, John Mattill, Editor, included a short clip from the *Wall Street Journal*, December 19, 1968, in which our good classmate, *Ralph E. Cross*, gets a big mention. It appears that Litton Industries of Beverly Hills, Calif., have reached an agreement, preliminary, with the Cross Company of Fraser, Mich., whereby the Cross Company will be acquired by Litton through an exchange of stock valued at many millions of American dollars. Only a couple of issues back, we wrote up *Ralph Cross* in a routine fashion, as we

usually do, with an account of the Cross business, as it came to me through *Ralph*, who is without any doubt one of our more distinguished classmates, and hence gets a little extra attention when such is indicated. The Cross Co. produces automation machinery for metal working and assembly operations, and computer controlled manufacturing systems. Earlier, *Ralph* says that his company acquired the CIC Company for an undisclosed amount of cash (this is unusual), and now predicts that the CIC acquisition will add upwards of 15 million annually to the Cross business. The point here is that poor old *Ralph* had to quit M.I.T. early to go home and get behind the wheel to keep the Cross company solvent in those really tough times. Not that it proves anything, but, some people do leave M.I.T. and with good reasons. Maybe I will hear from *Ralph* as I did send a card asking why he moved from Grosse Point Shores to Fraser, Mich. So, indirect thanks to *Ralph Cross*, and the very best to him in this new venture, from all of us. A week has gone by since I wrote the bit on *Ralph Cross*, and, he came through with the same identical clipping, as above, which makes it all official. This concludes this month's endeavor, and, without much from the clipping gang, and with no changes of address, and loveliest of all, no more reports on depletion of the ranks via decease. This is not always the best month for class news, so, we submit that we are more than usually lucky. Our very best to all you from whom I have heard, and where are the rest of y'all?—*Warren J. Henderson*, Secretary, M.I.T. Class of 1933, Fort Rock Farm, Drawer H., Exeter, N.H. 03833

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Plans for the 35th Reunion at the Harborside Inn at Edgartown on Martha's Vineyard, June 13 to 15, 1969, are now moving into high gear. Over 50 firm commitments are now on hand, plus an equal number of highly probables. There are plenty of fine rooms available; so if you haven't already done so, send a postcard or a note to *Paul Wing, Jr.*, Masoneilan International, Inc., 63 Nahatan St., Norwood, Mass. 02062, to make sure you are included on the mailing list, which for reasons of economy, has to shorten with each successive mailing. *Paul Wing*, our chairman adds: "As an Old Cape Codder myself, I know that many of you have never been to 'The Islands.' This is your chance. It is easy to get there either by plane or by frequent ferry service (45 minutes sailing time). *John Hawkins* heads up the transportation department, and full details will be sent to registrants well in advance. Cars may be left in Falmouth or Woods Hole, or special rates will be available for early reservations on the ferry. A car is not necessary, but it makes it easier on the golfer or the skin-diving enthusiast.

Remember—the late date plus the location improve the chances for a top-notch weekend in the company of your

classmates, to say nothing of the beaches, boating, shops, antiques, and scenic tours. . . . Eleven members of our Reunion Committee met on January 13, at the Braintree, Mass., Charter House and had a lively meeting.

Bob Franklin has retired from Sperry, built a home on the Cape at Brewster, Mass., with seven acres of land. He and his brother-in-law have been scalloping for pleasure and business with accent on the pleasure. . . . **Phil Walker**, Vice President of the Frank L. Adams Company, Worcester, Mass. reported that his son, Doug, is at U. of Mass., Class of 1969, and his daughter, Joan, was to be married in February, 1969. . . . **Jack Pekin** has completed 25 years at Raytheon's Waltham plant. He has three daughters. Joan, B.U., '63, is the wife of a doctor; Roberta, U. of Mass., '64, Salem State, M.S.'67, is teaching while her husband is working for his doctorate at Cornell. Ellen is a junior at Lesley.

Ed Chiswell writes: "I have now been transferred to Chevron Oil, Europe to stay in London for some time. My wife and youngest daughter are enjoying the assignment and opportunity to travel. The other five seem to be making out fine in various parts of the states."

Frank Safford is the inventor of the "High Intensity Continuous Plate Quench" and the "Roller Pressure Plate Quench" which have made possible the production of new grades of steel plate. The first of nine installations was at Bethlehem Steel's Burns Harbor plant where they now produce their grades designated as 'RQ-C-60', and RQ100A and 100B.

George Bull writes: "Some months ago, I read an "ad" about a trip to India run by Alumni Flights Abroad. After much pondering, I talked it over with Mary Elizabeth. As a young girl, she had been in India on a trip around the world, but had seen very little of India as her father was very sick during the time they would have spent there. She was quite in favor of our going.

"The group met in New York at Kennedy Airport. There were three single men and twelve married couples. Marion Boyer, of the Class of 1925, was the only other M.I.T. man, the rest were Yale, Harvard, Princeton and Stanford. Among the Harvard men was Robert Saltonstall whom I remembered from watching hockey games at Andover where he played for Exeter. Hrones, Johnson and Williams may remember playing against him for the Institute while he was on the Harvard team.

"After a one-day stop in London, we flew to Bombay with a stop at Kuwait. Arrival there was before dawn and the twenty-four or so giant gas flares were quite a sight, but made one sad to think of all that good hydrocarbon going to waste. . . . We went to the major cities, such as Agra, with the Taj Mahal; Delhi with the Red Fort. We went up to

Katmandu in Nepal and were fortunate enough to see Everest during the flight up from Calcutta. One of the most amazing sights was the Kallasa Temple at Ellora. During the 8th and 9th Century with primitive tools, a Hindu temple was carved out of the face of a cliff. By going into the cliff and digging trenches and then making two right angles, a huge piece of standing rock resulted. This was then carved into a three story temple 96 feet high with windows and decorations. In the process, 3 million cubic ft. of rock were removed. Our last stop in India was at Srinagar in the Vale of Kashmir. There, China, U.S.S.R., Pakistan and Afghanistan come together and there is a real Central Asia look to the people. The trip concluded with a few days in Iran, where the prosperity due to oil and the progressive policies of the Shah made a happy contrast to India's poverty and over-population."

Herb McKeague has been named Manager of Corporate Manufacturing Planning by Motor Wheel Corp., Lansing, Mich. Herb joined Motor Wheel from Westinghouse in 1947 as Director of Purchasing. Motor Wheel employs 5,800 people in 10 U.S. plants and is a major manufacturer of wheels and brake drums for the auto and truck industry.

A. G. Fox had a paper published in a recent issue of *Quantum Electronics*. The bibliography covers his years since M.I.T.: "In 1936, after a short time with the General Electric Company, he joined the Technical Staff of the Bell Telephone Laboratories, Inc., where he engaged in development work on mobile radio transmitters and an early radar project. In 1939, he transferred to the Radio Research Department of Bell Telephone Laboratories at Holmdel, N.J., and participated in the research on waveguide techniques being carried on under the direction of Dr. G. C. Southworth. For two years during the war, he was concerned with microwave radar design at the Whippany Laboratory. In 1944, he returned to Holmdel, where he took part in the pioneering of the Bell System's first microwave radio-relay system, and later engaged in millimeter-wave research. From 1953 to 1960, he was in charge of a microwave physics group doing research on ferrites, dielectrics, and semiconductors. He is currently head of the Coherent Wave Physics Department concerned with research on lasers and related optical subjects.

Mr. Fox has been active on IRE Technical Committees and was Chairman of the Committee on Antennas and Waveguides for several years. More recently he has been chairman of an IEEE Subcommittee on Masers and Variable Reactance Transducers and is currently an Associate Editor of the *IEEE Journal of Quantum Electronics*.—**Norman B. Krim**, Secretary, 15 Fox Lane, Newton Center, Mass. 02159; **George G. Bull**, Assistant Secretary, Mid-Atlantic, 4961 Allan Road, Washington, D.C. 20016; **James Eder**, Secretary, 1 Lockwood Road, Riverside,

Conn. 06878; **W. Olmstead Wright**, Secretary, 1003 Howard Street, Wheaton, Ill. 60187

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This month's mailbag contains a clipping from the *Motion Picture Herald* of last November 6, with an article entitled "Exhibitor on the Go—Julian Rifkin." As if he weren't busy enough as head of his New England based theatre circuit, Rifkin Theatres, he is currently serving as president of the National Association of Theatre Owners and devotes considerable time and effort to working for the Will Rogers Hospital and for *Variety*. The Rifkins live in Cohasset and Leah Rifkin is co-owner of an art gallery in Cambridge.

Colonel Al Bagnulo, USA (Ret.), has been with Pope, Evans and Robbins for almost two years. As Associate Partner he is in charge of their Alexandria, Va., office. In addition to conducting the normal activities of a consulting engineering firm, Al is working on the development of a new type of coal-fired boiler and related air pollution control systems.

Donaldson McMullin, who maintains an architectural office in Wellesley, and lives in Weston, Mass., writes that his oldest daughter is married and living in Marion, Mass.; his son Scott put himself through Syracuse and was simultaneously admitted to the Sloan School and the Naval Officers' Candidate School. He is currently serving in the Navy. His second daughter is a ski instructor at Okemo in Ludlow, Vt. (although last summer she worked as a waitress at the M.I.T. Faculty Club). His youngest, a son, Alec, is still in the Weston Schools and is an automobile nut.

Captain C. Donald Brown, USN (Ret.), as of last July, is Admissions Officer for The School of Engineering and Applied Science, George Washington University in our nation's capital city. . . . **Edward Halfmann**, Director of Research at Philadelphia Electric Company, was recently elected a fellow of the I.E.E.E. . . . **Webster Francis** reports that he is Vice President of Curlator Corporation in East Rochester, N.Y., where he has been associated since 1959. The firm makes machinery to produce fibrous webs for non-woven goods. Both his son and daughter are married and the former has presented him with three grandchildren. . . . Another proud grandfather is **T. Ledyard Blake-man** who admits to holding up very well under the strain of passing years. He and his wife, Virginia (Course IV, '34), summer at Cataumet on Cape Cod and winter in Princeton, N.J. where he makes his headquarters as an adviser to states, regions and counties on planning. Mrs. Blakeman is an artist. . . . **Stanley Smith** was recently promoted to General Manager of the Energy Controls Division at Bendix with which he has been affiliated for 28 years. Last summer he spent six weeks at Cornell in their summer Executive Development Program.

Charles Holman has resigned as Vice President, Manufacturing, for the Coatings and Resins Division of PPG Industries and has accepted a position with Reichhold Chemicals, Inc., as Vice President. He expects to serve as technical assistant to the Chairman of the Board and to be active in the Company's world wide operations in chemical, resins, and coatings. He will continue to live in Pittsburgh for a year or two and then move nearer to the Reichhold Corporate Headquarters in White Plains, N.Y. His present address is 4012 Lord Lyon Drive, Gibsonia, Pa. 15044.

Much of this news has come from contributors to the Alumni Fund, for which I am grateful. How about some of you as yet unheard from? Do send in a bit about yourself and family with your contribution, or if you have already contributed how about writing to me directly. I'd appreciate hearing from you.—*Alice H. Kimball*, Secretary, 20 Everett Avenue, Winchester, Mass. 01890

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Les Klashman, Northeast Regional Director of the Federal Water Pollution Control Administration, recently received the Department of Interior's Distinguished Service Award from Secretary of the Interior, Stewart D. Udall. This was the first time in the Interior's thirty-seven-year-old history of awards-convocations that FWPCA personell have received the Distinguished Service Award. Les was cited for distinguished contributions in the field of water pollution abatement. He joined the Massachusetts Department of Public Health upon graduation and served with them until he was called up by the Army Corps of Engineers in January 1941. Les saw service in North Africa, Sicily and Italy and was separated as a Major in 1946. He served with the Veterans Administration as a design engineer and was loaned for a three-month period as a special World Health Organization consultant in Malaria control in the Philippines.

In 1951, he joined the U.S. Public Service in its Division of Water Supply and Water Pollution Control. In 1962, he was named Regional Director at Denver, Col. When the FWPCA was shifted to the Department of the Interior 1966, he was named Director of the FWPCA Northeast Region, which includes New England and the states of New York, New Jersey and Delaware. Regional headquarters are in the John F. Kennedy Building, Boston.

Les is a member of the Federal Water Quality Association and the American Academy of Sanitary Engineers and a registered professional engineer in Ohio. He and his wife make their home at Charles River Park, Boston.

Samuel Litman is a Professor of Engineering, U.S.C., Columbia, S.C. and is also Vice President of WNOK-TV—A.M. F.M., Columbia, S.C. . . . *Ed Brittenham, Jr.*, is Vice President of Engineering,

Goodyear Aerospace Corp., Akron, Ohio. . . . Professor *Herbert F. Goodwin* of the Institute recently headed a panel for the Wofac Corporation, Westboro, Mass., for 33 German business executives and educators on a tour of this country. . . .

Bob Vogeler is now teaching science and mathematics at St. Mary's Boy's High School in Greenwich, Conn. . . . *Bill Wold* has been appointed director of the department of International Goals of the Bahá'i Community of the United States. Offices of the department are located at the National Bahá'i Center, 112 Linden Avenue, Wilmette, Ill. He recently retired as president of William C. Wold Associates, Inc., a transport aircraft sales and leasing firm with offices in Greenwich, Conn., and New York City. Born in New York City, Bill was employed up to 1949 by Consolidated Vultee Aircraft (now the Convair Division, General Dynamics Corporation) in various engineering and managerial capacities in connection with the development of several types of military and commercial aircraft.

In 1948 he was appointed New York manager for Convair, and resided in Greenwich, Conn., until his move to Wilmette. Bill is a member of the Wings Club (N.Y.), National Aviation Club (Washington D.C.), American Helicopter Society and the American Institute of Aeronautics and Astronautics. He holds a private pilot's rating for a single engine aircraft. He is married to the former Louise Saunders of Dallas, Texas. They presently reside at 1132 Michigan Ave., in Wilmette, Ill., with daughter Tannye (18), and sons John (16), Anthony (14), and David (10). Another son Daniel (20) presently resides in Greenwich, Conn.—*Robert H. Thorson*, Secretary, 506 Riverside Ave., Medford, Mass. 02155; Professor *Curtiss Powell*, Assistant Secretary, Room 5-325, M.I.T., Cambridge, Mass. 02142; *Jerome Salny*, Assistant Secretary, Egbert Hill, Morristown, N.J.

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The March notes start off on a sad note: *Burt Aaronson* was killed in a fire in his store in Brookline—this information courtesy of *Dave Morse*.

First soap opera

We have a report from *Bert Grosselinger*: "As of November 1, switched from Western Hemisphere Engineering Consultant to Farbwerke Hoechst A. G., Frankfurt, Germany, on full-time basis to half-time basis in interest of diversifying my activities in licensing, engineering, and joint venture operations in the international field." Then we received a card from Bert from Haiti: "Have been here in connection with a copper mine now that I am in the consulting field. I mentioned at the reunion that I was trying my hand in sculpture and acting and have made some progress in both since then. Last Friday I was on my first TV soap opera; and my first sculpture (18') has been delivered."

Your Secretary had a Christmas card from *Andy Stergion* who apologized for not making the 30th reunion, but has promised to make the 35th. Andy has five children, plus one granddaughter at this point. His older son plans to go to M.I.T. for graduate work next fall.

Bob Solomon makes some very cryptic remarks: "Consultant to Senatorial Committee on Aging; Contributor to *Recent Advances in Aging Research*; Associate Clinical Professor of Pathology, U.S.C."

A note from *Bruce Old* in January indicates that he was elected to the National Academy of Engineering April 1, 1968. . . . Each year *Bob Treat* sends me a detailed bulletin on the comings and goings of the various Treats as a Christmas greeting. In boiling this down, it would appear that Bob could not make the 30th reunion because he was working on his summer cottage. . . . A note from *Mert Barrows*: "Just designing lots of houses and going to Europe again next Spring."

Gus Rossano writes: "My wife and I and eight children migrated to the Pacific Northwest in 1963 after three years on the faculty of California Institute of Technology. I am a Professor and Director of the graduate studies program in Air Pollution of the University of Washington, Seattle. Three of our children are enrolled in the University. We greatly enjoy the Northwest."

Ray Popkin scribbled a few lines to say: "Now President—Director of Research, International Scanatron Systems Corp., Wyandanch, N.Y., makers of graphic communications equipment (facsimile) and electrosensitive recording paper." . . . *John Petroskas* complained to me bitterly that he has three children in college simultaneously. Having had one in college, I can understand his problem.

George Fexy writes that *Bill Roper* has been nominated for promotion to Major General. Approval by Congress should have taken place by the time this is in print. Bill Roper reassumed command of the Ohio River Division on November 18, 1968. He served in the same capacity from October, 1966, to October, 1967, when his tour of duty was interrupted by being assigned to Vietnam as Commander of the 18th Engineer Brigade. His last assignment during a year's tour in Vietnam was Commanding General, U.S. Army Construction Agency, Vietnam.

Prior to a brief assignment in Washington, D.C., as Executive Director of Civil Works in the Office of the Chief of Engineers, Bill served as Louisville District Engineer from 1963 to early 1966. The Louisville District is one of four which make up the Ohio River Division, the others being Pittsburgh, Huntington and Nashville.

If you want your ad in this column, please write me.—*A. L. Bruneau, Jr.*, Secretary, Hurdman and Cranstoun, 550 Broad Street, Newark, N.J. 07102



President and Mrs. Herb Hollomon, '40, receiving congratulations following his inauguration as the eighth president of the University of Oklahoma.

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Some welcome items forwarded with alumni fund returns. *Winthrop M. Leeds* wrote that he was recently appointed Consulting Engineer for the Power Circuit Breaker Division of Westinghouse Electric Corp., at Trafford, Pa. Win also served as Delegate to the International Electrochemical Commission meeting at Arnhem, Netherlands. . . . *Irving Peskoe* was promoted to Colonel, Air Force Reserve, Judge Advocate General's Department. Irv was expecting to attend the Mexico City Annual Fiesta, his fourth. . . . Professor *William R. Hawthorne* has become Master of Churchill College, Cambridge, England, and head of the Engineering Department of the University. . . . *Robert W. Pratt* noted that he is still serving as Assistant Chief Engineer, Current Production Engines, Pratt & Whitney Aircraft, in Hartford, Conn. Bob has his first grandchild, David DeBandi Pratt, born October 6, 1968. Principal leisure activity: "flying my own light plane."

John M. Gray Jr. is Partner in John M. Gray Company, Architects, Boston. He also serves as chairman of the Salem Planning Board. . . . *Eugene D. Thatcher* is manager of Western Division, Donovan Construction Co., and General Manager for D-C-H Constructors, a joint venture, constructing the Nevada portion of the 750 KV DC Pacific-Northwest Intertie and other transmission facilities. . . . *Nelson T. Bogart*, wrote that after being vice president for Supply and Transportation of Standard Oil Company of California's Western Operations, Inc., a subsidiary) for two years, he is getting still further away from the refineries with the new job of Vice President for Industrial Relations, at Standard, which he joined in 1939. . . . Many thanks to you all for those timely notes.

Two more promotions noted: *Nicholas E. Carr*, has named general manager of First Chemical Corp, and *Harold W. Pope*, is now executive vice president of Sanders Associates, Inc., of Nashua, N.H.

Peter E. Kyle, Cornell '33 and M.I.T. '39, in mechanical engineering metallurgy, has joined the Mechanical En-

gineering Department of Norwich University, Northfield, Vt., as Associate Professor. . . . Most '39ers, I presume, know by now that Lieutenant Governor *Francis W. Sargent*, was elevated to the Governorship of Massachusetts when Governor Volpe joined the Nixon Cabinet. Perhaps Frank will join us for a few hours or days at our up-coming 30th reunion.

This one may be old news by now, but in September *C. Robert Wieser*, Deputy Director of Lincoln Laboratory, was granted a leave of absence from M.I.T. to become Assistant Director of Defense Research and Engineering, in the Office of the Secretary of Defense.

Have you all been making plans to attend the reunion? Here's someone who is doing just that: *B. C. Emerson*, wrote to me in December that he hoped many of us can make the 30th. As for his own news, he is Vice President and member of the board of the Gates Rubber Company, in Denver, "now sixth largest rubber manufacturer, with sales of \$400 million." . . . And *Ernie Kaswell*, Class Treasurer and Reunion Chairman, wrote with thanks for the plug in the December notes. But he said that money is needed for some of the preliminary expenses. How about mailing him some checks for five and ten dollars and up? Send them to: *Ernest R. Kaswell*, Fabric Research Laboratories, Inc., 1000 Providence Highway, Dedham, Mass., 02026. And if you wish to phone with suggestions, ideas, offers of gifts and favors, etc. try him at Area Code 617, 326-5500. One news item that Ernie included: *George Blake* is now Division Marketing Manager with Westinghouse, in Pittsburgh.

Two deaths to report: *David W. Mullin*, of Montclair, N.J., in April, 1968, and *Bernard B. Langton*, of Boxford, Mass., on July 30, 1968.—*Oswald Stewart*, Secretary, 3395 Green Meadow Circle, Bethlehem, Pa. 18017

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Dave Sunstein notes that half of his six children have been at Tech. His oldest, Bruce, received a Bachelor of Human-

ities degree in 1965; his second, Drew received a B.S.E.E. in 1967; his third, Laura, married Syd Martin B.S. (M.I.T.) 1967, and M.S. Sloan School, 1968. His fourth is a freshman at Brandeis, fifth a senior in high school with courses at Haverford College and his sixth is in the sixth grade in Episcopal Academy.

Abraham Rockwood is still with Maurice A. Reidy Engineers where he has been since returning from military service. . . . *Joe Greenberg* has had foreign consulting assignments in Korea, Japan and Germany during this past year. Joe visited Japan three times, Korea twice and Germany once. . . . *Clement Burnap* notes "Moved to San Francisco as Vice President-Marketing and Engineering of Yuba Industries after 10 good years with N. American Rockwell. Have gone from nuclear plants, aircraft, Apollo center and submarines for offshore oil to cranes, dam gates, heat exchangers, gold dredging, uranium mines and chemical plants—Great!"

John Casey, who now resides in Dallas, Texas, recently joined Braniff International as executive vice president in charge of operations and services and has also been elected a director of the airline. Previously he was senior vice president and director of Seaboard World Airlines. At one time John was president of Dick Speas Associates. . . . *Eldred Timson* is vice president of research, engineering and quality control of Sunbeam Corporation and has been elected to the USA Standards Institute's Board of Directors. Eldred has been with Sunbeam since graduation from Tech.

Sooner Magazine, the University of Oklahoma magazine, has a drawing of *Herb Hollomon* on the cover and many of the articles and pictures are concerned with the inauguration of Herb as the eighth president of the University on October 18, 1968.

Jack Schaum is the author of a review, *Metalcasting in '68*, for Michigan Purchasing Management, while *Arnie Arch* who is Executive Secretary of the Air Pollution Control Association was one of the speakers at the seminar on "The Economics of Air Pollution Control,"

sponsored by the Sterling Institute and held in Washington, D.C., during December.—*Alvin Gutttag*, Secretary, Cushman, Darby & Cushman, American Security Building, 730 15th Street, N.W., Washington, D.C. 20005

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Theodore H. Guething has been named Director of Development for Mackinac College, Mackinac Island, Mich. Theodore left his post of sales engineer with the New Britain Machine Company to assume his new responsibilities. He has been a trustee of the college since 1965 and is currently Vice Chairman of the Board of Trustees. His present mailing address is 725 South Adams St., Birmingham, Mich. 48011

Fred F. Flowers has been promoted to the post of President of DIFCO, Inc., Findlay, Ohio, manufacturer of mine cars and locomotives. . . . *Julius A. Kohn* is currently a Program Manager in the Armament Department of the General Electric Company in Burlington, Vt. He reports that he now lives "across the street from Lake Champlain" and refers enthusiastically to Vermont as a "Shangrila." . . . *John P. Cutler* is presently a Project Architect at Reid and Tarics, Architects and Engineers, San Francisco, Calif. John is a member of the American Institute of Architects. . . . *Franklin W. Kolk* presented Paper S-10 titled *Measurement and Evaluation of Aircraft Noise* at the 76th Meeting of the Acoustical Society of America held last November. Frank is associated with the American Airlines, N.Y. City.

Robert J. Demartini has been promoted to the post of Vice President for European promotions of the Huyck Corporation, Fairfield, Connecticut, which involves manufacturing and marketing Formex fabrics and hydrofoil for application to paper industries of EFTA, EEC, Iron Curtain and independent nations. The manufacturing plants are in Italy and England and sales offices in all major countries of free Europe.

Robert M. Fano is the author of an article entitled *The Place of Time Sharing*

appearing in the April, 1968 issue of *Engineering Education*. The article presents a careful analysis of computer time sharing systems in engineering education. It concludes with an estimated need of a reduction of cost by a factor of 10 before its use in engineering education becomes economically feasible. However, in view of the rapid progress in improving system design, such cost reduction appears achievable in a decade which is also estimated to be the time needed for development of the software by educators to properly program the computers for engineering education.

A question of choice

Howard Samuels is credited in the December 22, 1968, *Washington Post* with success in getting private banks to make loans with 90 per cent Small Business Administration guarantee and thereby greatly increasing loan aid over that of previous S.B.A. directors. The report states that since the July 1 beginning of fiscal 1969, S.B.A. engineered 88 loans in the Washington area for a total of \$3.5 million; 38 of them, for \$846,000, to racial minority businessmen. Whereas in the same fiscal period of the previous year under a different S.B.A. director, only 40 loans were made for \$1.9 million, with only 7 going to minority businessmen and amounting to only \$91,000. Despite this demonstration of business acumen, the article predicts that the Nixon administration will replace Samuels. But the January 17, 1969 *Wall Street Journal* indicates that Nixon will keep him on if he agrees to stay 4 years, swallowing his New York political ambitions. It also suggests that Samuels is willing, if Nixon will strongly back his ghetto aid plan.—*Walter J. Kreske*, Secretary, 53 State Street, Boston, Mass.; *Everett R. Ackerson*, Assistant Secretary, 831 Cranford Avenue, Westfield, N.J.; *Michael Driscoll*, Assistant Secretary, 63 Center Street, Nantucket, Mass.

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Very interesting article appeared in the *Investment Dealer's Digest* issue of December 9, by *Jerry Coe* about the outlook for on-line computer services. As

reported, Jerry is Vice President and General Manager of G.E.'s Information Services Division. He quoted an industry observer's estimate of the on-line information services market for 1968 at \$100,000,000 and growing faster than 15 per cent annual increase of the equipment sector of the computer business.

A feature in the Los Angeles *Times* tells of *Ron Shanin's* film projects including "African Safari" which we saw at our 25th reunion. This one will shortly be released by Crown Films and Ron has another film completed but not yet titled.

Fred Sargent 2nd, Dean of the College of Environmental Sciences at the University of Wisconsin, as co-author of a recent proposal, urges a Manhattan Project type effort to halt further deterioration of our environment. All the problems of noise, overcrowding and pollution are cited as needing urgent attention before they get completely out of hand.

Charles Estes writes that he is currently Technical Director of Motorola's Aerospace Center in Scottsdale, Ariz. Recent activity includes development of space electronics hardware of Mariner and Apollo. Motorola's S-band transponder will provide the astronauts' only means of communication with Earth after landing on the moon.

Harold Jaffe named Vice President for marketing of Airco Chemicals and Plastics. . . . *Wallace Frank* elected a director of the Delaware County Bank in Chester, Pa. Wallace is president of Spitz Laboratories, a McGraw-Hill subsidiary manufacturing planetarium projectors. . . . *Morton Goulder*, corporate scientist of Sanders Associates, Nashua, N.H. has been appointed a Vice President of the company.—*Ken Rosett*, Secretary, 191 Albemarle Road, White Plains, N.Y. 10605

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We received a fine letter from *Bud Cruckshank* of Illinois who told us that he was with classmates *Warren Knauer* and *Virgil Otto* on an architectural tour of Chicago in December with the

M.I.T. Club there. Bud also wrote, "Betty and I are fine and as far as we can tell so are our three girls. The girls are all in college, and the old homestead is really quiet. Our oldest, Linda is a senior majoring in medical technology at Westbrook in Portland, Maine. Sherilyn, our next, is a sophomore majoring in economics at Connecticut College in New London, Conn. Finally our baby Suzanne is a freshman at Butler University in Indianapolis, Ind. Last, I suppose least, I have been promoted to Vice President of Operations in our company, Value Standards, Inc. We are a small firm of consultants majoring in market research on customer attitudes and related costs."

The class treasury shows a balance of \$1,831.73, which is earning 5 per cent at Mechanics Savings Bank in Hartford, Conn. Although the 25th reunion was planned on a break-even basis, the conservative approach of the committee, along with unexpected reductions in the expenses, resulted in a \$1,400.00 surplus, which went into the treasury.

With sadness I report the sudden death of *Robert W. Byloff* in New Canaan, Conn., on January 18, 1969. Bob was president of the Reeves Video Division of the Reeves Broadcasting Corporation in New York. He was a member of the systems engineering team that began the first successful broadcasting of color television for the National Broadcasting Company. He redesigned N.B.C.'s studio facilities in New York, Washington and Burbank, Calif., for color. The class expressed its sympathy to his wife Betty and his daughter Nancy.

Jack Kelly and I are taking turns writing these notes for you. Do not hesitate to write to us with news.—*Richard M. Feingold*, Secretary, 266 Pearl Street, Hartford, Conn. 06103; *A. J. Kelly, Jr.*, Associate Secretary, 34 Scudder Road Westfield, N.J. 07090

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In answer to a request by *Paul Robinson*, I agreed to relieve him of having to write the March notes as one of his assistant secretaries. The Reunion Committee is working on the details of the reunion; I have had several conversations with *Burt Bromfield*. He reports that there will be the traditional Alumni Day activities, along with a clam bake, a sightseeing tour, a cocktail party, and two dances. From another quarter, I have been advised that *Al Picardi* has been asked to be Chairman of a class nominating committee. He is presently talking to various members of the Class about suggestions for class officers. If you have any suggestions, contact him. By the way, he recently moved from Chicago to Washington, D.C. where he is presently doing consulting work.

In my travels over the past couple of months, I have run into a number of classmates. Here are their names, not

necessarily in any order, just as they come to mind. I had a short visit with *Jay and Tink Martin*, Jay is President of the Model Shop in Sudbury, Mass., and has become an expert in the use of diamond cutting tools. He has been over to London on several occasions to consult with the DeBeers people on ideas and methods. He has also been active in developing special lathes for tools, and has a line of armature lathes which are very unique.

During the past month, I have had occasion to talk to *John Kellogg* who has recently moved from Nashua, N.H., to Lexington, Mass. He is Vice President of Lytron Inc., in Woburn, Mass., a firm engaged in the design of special heat exchangers. John says that he has just gotten out from under the great overload caused by a move to a new plantsite about one and one-half miles from his old plant.

Late last year, I was on the West Coast, and managed to get in touch with *Sten Hammarstrom*. He merged his company with another firm in the area, and is quite pleased with the breadth of lines he is now representing. He has specialized in instrumentation of combustion and process controls. He tells me that his family is very acclimated to Glendora in southern California, and they consider the East as a foreign country altogether.

A note received from *John Hull* indicates that the news of the death of *Len Clancy* in an airplane accident about a year ago had not reached the notes. He was Director of Operations at Perkin-Elmer Corp., in Norwalk, Conn., and was on an equipment inspection trip with four other executives of the corporation in a small private plane when the accident occurred, I believe in Massachusetts.

In connection with the reunion, activities, I had occasion to talk to *Joe Shrier* in Cleveland. He is a stockbroker with Goodbody & Co. in Cleveland, and when not engaged with stocks, is an avid sailor. He sees *Bruce Fabens* several times during the summer when competing in citywide regattas.

Last summer, I happened to be in Branford, Conn., and stopped in to see *John (Jeff) Fries*. He is Vice President of Nutmeg Steel Castings and he showed me and the family around the shop in the evening. It was during the pouring cycle, and my two children (ages 10 and 14) were quite impressed with the show. I highly recommend a trip through a foundry with youngsters to see what hot metal really looks like. Jeff was a very excellent guide and took us through the whole process.

By the time these notes reach you, the class reunion will be but three months away. I know that there will be over 100 members of the Class there, and the committee working as hard as it is, it should be one of the highpoints of the year. See you there in June!—*Paul*

M. Heilman, Assistant Secretary; *Paul M. Robinson*, Secretary, 7710 Jensen Drive, Springfield Va. 22150; *John G. Barmby*, Assistant Secretary

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For the first time in months we have sufficient news for a column—thanks to you and the Review's news service!

The following note in *Jim Hoaglund's* Christmas card deserves to be shared with you all. "Mary and I left Phoenix, Ariz., in 1962 for Chicago where I took a job as Manager of Air Conditioning & Refrigeration Division of Bell & Gossett Co. Part of the incentive for the move was to put our kids in New Trier High School, a first rate school. Less than a year later, B & G was acquired by International Tel & Tel in their early days of U.S. expansion as a conglomerate. I have held five different jobs in the years since 1963, due to ITT's frantic pace.

"We were transferred to Philadelphia in 1966, where I received an assignment as Asst. Director of Engineering in a new Division. This after 19 years in sales and marketing and management of small business! I was made Vice President and Director of Engineering in 1967 of the Environmental Products Division of ITT with responsibility for six different engineering departments. As you can gather from the enclosure our three kids are all in college, I am broke, and Mary is in Graduate School at Temple University. We love Philadelphia and are busy with a full schedule of activities here."

As to Jim's children, details follow: John is a senior at Syracuse with after college plans undetermined at the moment. A favorite activity is Rugby and, as his Dad so aptly states, there is some question as to whether the real appeal lies in the game or the postgame beer and songfests! Judy is on the Dean's List as a pre-med student at Syracuse where she enjoys playing La Crosse. To the delight of her parents, Nora is a Freshman at Wellesley, mother's alma mater, where she tentatively plans to major in math. Again following in mother's footsteps. Nora has gravitated to the S.A.E. House on Beacon Street. Jim, we all thank you for a wonderful letter; please don't wait another 23 years for the next one!

In passing, should any of you want Jim's address or, for that matter, the address of any other classmate, please drop me line. *Bill Humphreys* formerly of Wellesley and Fenwal, Inc., of Ashland has moved to Sheby, Ohio, as General Manager of Autocall Company, a recent acquisition of Federal Sign and Signal Corp. Bill reports that he has a sailboat in the barn but no time or place to use it; leisure is spent mowing hay and feeding horses! . . . *Leslie G. McCracken*, Asst. Professor of Electric Engineering

at Lehigh, spent the summer of 1965 at the University of Maryland as a Faculty Fellow studying holography and the summer of 1966 at Asilomar, Calif., attending various technical conferences. . . . *Thomas C. Gurley*, XIII retired from the Navy in January 1967 and was initially employed by Stanwick Corporation, Arlington, Va., participating in various aircraft carrier overhaul projects. Tom is now a principal engineer with Ocean Science Department of McKiernan Terry Marine Systems, a Division of Litton Industries.

Richard B. Marsten of RCA's Astro-Electronics Division is Chairman of the A.I.A.A. Technical Committee on Communication systems. The December 1968 issue of *Astronautics and Aeronautics* contained a paper of Dick's titled "Communication Satellite Systems Broaden Ties to Aerospace Developments." . . . *Jim Shearer*, a physicist at Lawrence Radiation Lab in Livermore, Calif., is now deeply involved with laser research. . . . *Guy W. Gilleland*, with Minute Maid in Orlando, Fla., has been promoted to Director of the Fruit Program responsible for groves, harvesting, fruit procurement, packing houses, real estate and fruit trucking. . . . *Maryruth Jeffries*, a research assistant at the University of Miami's School of Medicine, recently received her commercial pilot's license. If Jeff is not flying she is skin diving so her note reports.

Norma F. Satten (Goldstein) is now Director of the Comprehensive Health Planning Program for the State of Kansas. Her son, Neal, is a sophomore at the Institute, daughter, Debby, is a freshman at Stamford, and daughter, Sara, a high school senior, an exchange student this year in London. Joe, Nora's husband, is Director, Division of Law & Psychiatry, Menninger Foundation. . . . *Jack Skinner* with Aerosonic Corporation, Clearwater, Fla., reports the following: oldest son, Charles, a history major graduating from Davidson in June; second son, Jim, a freshman at St. Petersburg Junior College, heading towards Aeronautical Engineering at University of Florida; third son accelerated in math and science; wife, Ruth, a registered nurse in Recovery Room at Morton Hospital.

The *J. J. Strands*, thanks to Edna's originality, had another unusual holiday greeting which showed several snapshots of their month's stay on Nantucket last summer. The lobster looked particularly inviting! The Hickey children fortunately continue to have their mother's charm and good looks, as do *Vinnie Butler's* children. I must say, however, that Buzzy has the twinkle of an angelic scoundrel. *George "Curly" Bickford's* oldest child Susan started college a year early at Kirkland (part of Hamilton College) in their charter class and loves it. George continues at Carrier as Project Manager, Information Systems, while Betty is now teaching art at the elementary school. "to help support

Kirkland!" *Sherry* and *Julia Ing's* Hawaiian Christmas photo is particularly refreshing to view on a dark, dark, wintry day.

The *Nick Mumfords* continue in good stead. Nicky is a Junior, Course II, at the Institute and as of my Detroit visit two days ago continues to be a starter and high scorer on the M.I.T. basketball team. Ayliffe, now a Junior in high school, plans to spend next summer in the Netherlands on an exchange program wherein some 40 of her classmates will swarm all over Europe. A particularly enjoyable note from the *Jerry Pattersons* at Christmas follows: "Another busy year—didn't make it to New York this fall as Libby and I took a late, and lonely, vacation at the Cape (Cod). Tony a Junior at at Coe College, Mark a freshman at Harpur and Rob also a freshman at Wilbraham Academy. Other than the necessary evil of working for a living main interests continue to be opera for me and horses for the rest of the family. Picture enclosed was high point of the year when Mark's horse won Green Hunter Champion at the State Fair for the second year. Rob is not in the picture but other than that it is the best family picture we've had in years!"—*C. H. Springer*, Secretary, MFB Mutual Insurance Company, 420 Lexington Avenue, New York, N.Y. 10017

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Wow! The mail during the last month has arrived at an unprecedented rate. Would you believe we received 37 reports from members of the Class of 1946? Would you believe 15? Would you believe one report? After checking and double checking we unfortunately must acknowledge that but one report was received, but it was a good one. It was from *Howard Auerswald* whose address is 154 Arlington Road, Longmeadow, Mass. Howard now has four children with the birth of a new youngster in 1968. The other children are 18, 16 and 10. Howard is President and principal owner of the Tubed Chemical Corp. of Easthampton, Mass., a producer of plastic tubes and other plastic packaging items. The company was recently merged into McCormick & Co., of Baltimore, a leading producer of flavoring extracts and other food products through an exchange of stock. Tubed Chemical Corp. will become a subsidiary of McCormick & Co., and will be known as Tubed Products, Inc., with Howard continuing as President.

Edward H. Bowman, Course XV, is Comptroller of Yale University and is teaching a graduate seminar in the University's Department of Administrative Sciences. . . . *Martin L. Ray* has been appointed Vice President of the Newport Division of Tenneco Chemicals, Inc. Martin and his wife and family live at Star Lake, Warrenton, a suburb of Pensacola, Fla. Martin is also active in the Navy League of the U.S. and is a member of the Board of Directors of the Commercial National Bank of Pensacola. . . . *Capt. H. F. Lloyd*,

USN, has commanded the Naval Air Technical Training Center, Memphis since July, 1966. This Center trains selected aviation personnel in the technical phases of Naval Aviation. . . . A short note informs us *Stanford D. Blitzer* has joined Boeing Vertol as Technology Manager for Flight Controls.

Policy established

You may recall that last month we assigned eighteen or so class members the task of reporting their activities the past twenty-two years. It was our hope that assigning this as homework would rekindle school memories of the necessity to complete this type of work promptly.

Therefore, in keeping with this established policy we are assigning the following class members the task of reporting on their activities. *John R. Green*, *Weston W. Goodnow*, *Robert Cuccioli*, *Alan R. Gruber*, *Alexander E. Halbertstadt*, *Winchell T. Hayward*, *Russell A. Foust, Jr.*, *H. Frederick Goelzer*, *David R. Longmire*, *Lorenzo B. Lea*, *Lewis T. Mann, Jr.*, *Robert F. Hoffman*, *Wm. M. Jackson*, *Daniel M. Kelley*, *Wm. F. Herberg*, *Herbert J. Hansell*, and *Stuart Edgerly, Jr.*

Threats, lies and intimidation

In order to assure that the above will provide us with the requested information we feel we must resort to threats, lies and intimidation. Therefore, it is only fair to warn you that the following will result if a report of your activities is not submitted quickly:

- (1) Your name and address will be given to 547 different charities who will fill your home and office with unwanted and unsolicited neckties, trinkets, Christmas cards, and those little return address envelope stickers. In keeping with the tradition of the printers of these stickers, in all cases your name will be slightly but cleverly misspelled, or the address will contain mistakes which will prevent your using these stickers whether you wanted to pay for them or not.
- (2) A malicious and slanderous letter will be sent to the subscription department of the *Saturday Evening Post*. It will inform them that in spite of any urban or suburban aspects your zip code indicates, you are really not a sophisticate but just a big rube. Word of this will be quickly spread to your neighbors forcing a lowering of your social status.
- (3) Any of you who still have relatives in Germany, Alabama or Chicago will learn to regret your neglect in not preparing such a simple report.

The above is just a partial list of the calamities planned, so please avoid all this by replying promptly. Threateningly yours—*Russ Dostal*, Secretary, 18837 Palm Circle, Cleveland, Ohio 44126

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Some warm rainy weather has eliminated our skiing and skating and leaves this

weekend for catching up on paper work, so I have decided to start with these class notes. *Marty Landau* writes to say that *Fred Grant's* 20 years from B.S. to Ph.D. is far from unique. Marty received his B.S. in E.E., in June 1947, but his Ph.D. in Mathematics from Lehigh was awarded in October 1967. He suspects that Fred received this Ph.D. in June, therefore Marty is a good four months more laggardly. He is an assistant professor at Lafayette in Easton, Pa., and points out that with children 12, 13 and 15 years, his spare time is spent worrying about financing 12 student years of college in seven calendar years.

Jim Robertson writes that he is now sales manager for Information Management Operation with G.E. in Schenectady. This involves systems software work with industry and government. His 12 student years are entirely different from Martys since he now has a son as a Harvard sophomore, a daughter as a high school freshman and a second daughter getting ready for nursery school. I fear that my problem is similar to Martys though a few years later.

David Yablong is president of the Lefan Building Corporation, a construction and management firm in Chicago where he is a member of the Chamber of Commerce and does some teaching at Chicago Loop College. His wife, Inez, also teaches Spanish in the Chicago Schools. They reside with their four children in Wilmette, where Dave is a scoutmaster. Their oldest son 16 is thinking of going to M.I.T. *Henry Lee* has taken up hunting as a hobby and his latest trophy is a mountain lion from the high Sierras. He has also written another textbook *New Linear Polymers*.

Until called to my attention by the clipping services I didn't realize that *Marcus Saxman*, pictured in the November *Fortune*, was a classmate. Since he has even less hair than I, my assumption was that he must be from an earlier class. The article concerned the specialty steel companies and Marcus is President of Latrobe Steel where he started as a metallurgist and later switched into sales. At Latrobe he had entailed a new \$12-million finishing mill. That is it for this month and now on to balancing the check book and if energies hold, a start on taxes.—*Dick O'Donnell*, Secretary, 28516 Lincoln Road, Bay Village, Ohio 44140

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A guaranteed way to find out if classmates are reading this column is to make an error in the news reported. In the December notes, I reported the presentation of an award that was not given. In November, I gave an erroneous description of the activities of Creare, Inc., of Hanover, N.H. *Bob Dean*, President of Creare, wrote and described the exciting environment at Creare which is devoted to providing an optimum environment for the highly creative technical man and the

full exploitation of his inventions. Subsidiary corporations are formed to manufacture and market while Creare concentrates on the inventors. Creare has been in business since 1961 and they employ about 20 people. Bob is a full Professor of Engineering at Dartmouth. He was recently elected a Director of the Ecological Science Corporation of Miami (Formerly Southern Gulf Utilities, Inc.). It was reported erroneously that Creare was designing and operating water and waste treatment plant.

Warren King has continued to add to his string of successfully completed projects. His consulting firm is active with several industrial companies, as well as with the governments of several states. Warren took me to lunch at the Town Club, which is on the top floor of his office building and offers a breathtaking view of Chicago. Warren's firm has studied the noninstructional operation of two state universities. On the walls of his office, there are many photographs of Warren with state governors. Warren and Jean enjoyed our 20th reunion at Martha's Vineyard. One of his memories was the quiet morning that they enjoyed at the beach near our hotel. In 1948, "when we were young," Warren frequently dropped me off in South Hadley on his way to see Jean at Skidmore.

Harold Field is an attorney and is currently President of the M.I.T. Club of Minneapolis. Harold should try to bring the '48 members of the Tech Show together and put on a show at our 25th reunion. *Dennis Allegretti* is in Chicago. *Bob Abelson* is at Yale, *Gerry Sapolsky* Kunstadter is in New York City, *Phil Friedlander* is in New York City, *Jim Adestein* is at Harvard Medical School, *Bill Katz* hasn't left Cambridge, and *Phil Macht* is in Baltimore. It would be a great show.

Harry and Fran Meyer had a busy 1968. Harry was elected to the local school board. Harry and Fran and their three daughters, Janet, Ellen and Francie, all teach or tutor in various volunteer programs. Harry and Fran sandwiched in some wonderful experiences between business meetings in Europe. In England, their British friends helped them explore London. In Scotland, they really stayed a night on the "Bonnie, bonnie banks of Loch Lomond." Germany and Spain completed the trip before they returned home to Freeport, Ill.

David L. Walton writes from Viet Nam where he has been since 1965 developing USO clubs for U.S. military forces in Viet Nam. "The U.S. has much to give to Viet Nam," but he says, "It has much to learn." *Ben Dann* was elected President of Hendrick Mfg. Co., in April, 1968. *Tom Kuebler* was elected President of Uniflow Mfg. Co., Erie, Pa. in November, 1968. Their company products commercial refrigeration equipment, water pumps, and treatment systems.

Some of our classmates have sent us notes on their current activities. Lieuten-

ant Colonel *Robert E. Burrows, Jr.*, indicates that he has retired from the Army and is now associated with Cornell, Howland, Hayes and Merryfield, consulting engineers, in Corvallis, Ore. . . . *James E. Manson* has taken his wife to a COSPAR meeting in Vienna and his family to White Sands. When he isn't traveling or working for the Air Force (AFCR2) on X-rays he can be found residing in Concord, Mass., with his wife, Nancy, and his three children.

Richard C. Barbera has been awarded his Doctor of Education degree from Boston University and is now Assistant Professor of Science at Boston University College of Basic Studies.

AC Electronic's new Director of Engineering and Sales is *Donald J. Atwood*. Don has responsibility for both research and development and for administration of AC's programs for commercial and government customers. . . . *Harry M. Graham*, who has spent twenty years with L.T.V., has been named Vice President-Manager for the Missiles and Space Division, Michigan Facility, of the L.T.V. Aerospace Corporation.

Steve Wilder, has designed the Omega car, shown at the 12th annual New England-International Auto Show. Steve, a Brookline native who now lives in Charlotte, N.C. has raced cars both in Europe and the U.S. . . . *Glenn R. Hilst*, Vice President and Director of the Environmental Sciences Department of the Travelers Research Center, has been elected a member of the Council of the American Meteorology Society. He was appointed to the Society's Executive Committee, and accepted the editorship of the *Journal of Applied Meteorology*.

Morris Tepper is a NASA liaison member of the National Research Council committee to plan U.S. participation in the Global Atmospheric Research Program which is coordinated internationally by the International Council of Scientific and the World Meteorological Organization. . . . Appointment of *Frank J. Rossi* as corporate industrial engineer of Oglebay Norton Company has been announced.

Bruce King, Vice President, Product Development, The Brush Beryllium Co., has published an article in the *SAE Journal* on a modified process that gives superior beryllium. Bruce has been with Brush Beryllium since 1960.

E. J. Corey has presented a paper on the total synthesis of Prostaglandins at the Robert A. Welch foundation Conferences on Chemical Research in Houston, Texas. He now has three children, two boys and a girl. . . . The final A.C.S. tour speaker of the last season in Oklahoma was *Sanford M. Siegel*, professor of botany and plant Physiology at the University of Hawaii. His subject was "The General and Comparative Physiology of Life Under Stress."—*S. Martin Billett*, Secretary, 16 Greenwood Avenue, Barrington, R.I. 02806

If you are reading this promptly on its arrival, chances are *Stan* and *Roz Margolin* are still in Bermuda making arrangements for our 20th reunion. Never were the details of an event so tenderly watched over. And so they should be because the committee wants you to have the time of your life. On the island of Bermuda, this shouldn't be hard. We are particularly gratified at the number of children who will be coming along—thirty by the latest count. Also by the distances people are travelling. Men are coming from as far away as California and Norway. It seems to me this says something rather nice about our class spirit.

As mentioned in the January notes, *Paul Weamer* has prepared a questionnaire which is being sent out to all of you. The answers will be computer analyzed and presented at the reunion. The results should be interesting so please return the questionnaire promptly whether you plan to attend the reunion or not. The next class secretary will find that he has an easy job of getting started on this column if he has plenty of questionnaires to work from. In my own case, the questionnaires from the 15th reunion kept me well supplied with information for two years.

Once again, I must express my deep appreciation for the personal notes which a good many of you have kept on sending.

Bob Peterson writes from somewhere in Iran (the postage stamp was gorgeous) that he was recently transferred to the head office of the Iranian Oil Operating Companies as Senior Management Analyst in the Organization and Productivity Division. Before this he spent seven years in Organization and Productivity, Abadan Refinery, most recently as Head of the department there. *Rodney Bauer* reports that, as of last August, he was made Vice President and Director of Marketing for the Minerva Wax Paper Company of Minerva, Ohio. However, Rod says to note his new address which is 243 Cheese Spring, Wilton, Conn. 06897. I would have thought the new address was going to be in Ohio but it is nothing for '49ers to run things from afar. Plenty of them do. *John R. M. Alger* sends a note postmarked Liverpool, N.Y. saying that he is now Manager of Engineering for our black & white television business. I assume that the "our" refers to the General Electric Company for whom John was formerly manager of the Custom Product Systems Operation. John has three children, 14, 11, and 7.

Lieutenant Colonel *George P. Haviland* writes: "Greetings from Saigon, the vacation spot of the East. Just finished work on a Ph.D. at UCLA and am now in Operations Analysis at Headquarters, 7th Air Force. Any word on an M.I.T. Club here? Best regards to everyone in Course XVI, Class of 1949." No, George, we don't seem to have an M.I.T. Club in Saigon. The nearest one is in Bangkok,

Thailand and the Club President is *Phra Bisal Sukhumvit*, '23, Saladaing House, 5 Silom Road.

Harold A. B. McInnes asks simply: "Please send info re Bermuda Reunion." note a month ago when I would have been writing the February notes. However, I was in bed with the flu. In any event, you surely should have received complete details by now. We sent out over a thousand letters with complete details and application forms January 31 and unless we have a wrong address for you, you should have all the information you need, particularly prices about which people are naturally curious.

Flu kept me from noting earlier the very pleasant news letter which the Jack Fogartys send out every Christmas. Jack, in addition to having what seems to be the most normal family in America, is a Senior Electrical Engineer at the Elco Company in Philadelphia, Pa. In this capacity he heads up all electronic design and manages Field Service. Jack's main outside interest is Scouting but the demands of office have been so heavy that he swears this is his last year.

Outstanding contribution

Bruce D. Gavril (S.M.'49, M.E.'51, and Sc.D.'54) was recently given a \$1000 Outstanding Contribution Award from the Data Processing Division of IBM for his role as "architect" in the development of a Special Control Unit known as the IBM 2903. This general purpose control unit makes possible the attachment of a variety of special devices to the input/output channels of System/360 Models 30-75. These devices include: "Satellite" processors, analog-to-digital converters, plotters, printers, displays, recorders, and laboratory test instruments. For those of you who understand computer talk, the 2903 is a versatile, programmable digital interface to IBM's famous System/360. Dr. Gavril was married last July 7 to Jean Van Leeuwen, of New York, an editor and writer of children's books. They presently live in Manhattan.

Harold Ingraham has been elected vice president of individual insurance operations at New England Mutual Life Insurance Company in Boston. Harold joined New England Life in 1967 as actuary. He is a Fellow of the Society of Actuaries among many honors in the field. He and his wife Sandra live in Dover, Mass., with their three children, Jeffrey, Elizabeth, and Suzanne.

Stay or go?

Bill Haddon has been in the news so continuously as Director of the National Highway Safety Bureau that he needs no introduction here. In the eyes of many, Bill has done a magnificent and nearly impossible job of promulgating and enforcing motor vehicle and equipment safety standards. But with the change of administration, it is usual to expect that top people will be replaced by favorites of the incoming administration no matter how outstanding the incumbent has been. With this in mind, Carroll W. Boyce, Edi-

tor-in-Chief of Fleet Owner, a McGraw-Hill publication, addressed an open letter to President Elect Nixon stating that the one and only man to head the N.H.S.B. was Bill Haddon. As of this writing, I do not know what the outcome has been. Hopefully, common sense will prevail. If not, I'm sure Bill Haddon will be out of a job for all of twenty minutes.

Engineers' Pay Check\$ is the title of an article by *John Alden* in the *IEEE Student Journal*. It makes cheery reading for most engineers. John is Director of Manpower Activities at the Engineers Joint Council, as well as Executive Secretary of the Engineering Manpower Commission and Director of the National Engineers Register.

NASA's Electronics Research Center is reorganizing its technical structure to meet the changing requirements of the nation's space and aeronautics programs. In this connection, Dr. *William Z. Leavitt* of Newton, Mass., has been chosen to direct NASA activities in the field of biotechnology.

Once again, the highly organized M.I.T. Club of Mexico City is staging another of their fiestas. This annual affair, now in its 21st year, will occur on March 13, 14, and 15. President Howard W. Johnson will be the featured speaker on the 14th. The total cost of the three-day affair is \$60 per person payable to M.I.T. Club of Mexico City, Reforma 116-804, Mexico 6, D.F., Mexico.

Clyde M. Adams whose research on welded rails promises to take the clickety-clack out of train travel, has resigned as Professor of Metallurgy at Tech to become the first Pelton Professor of Metallurgical Engineering at the University of Wisconsin at Milwaukee.

At the January 27 Alumni Council meeting I saw *Bill Howlett* for the first time in nineteen and one-half years. We had worked on the Walker Cafeteria staff together. He hadn't changed one iota. Bill is the energetic president of the Union Iron Works Co. in Herndon, Va. His presence in Cambridge was occasioned by the fact that he has just been nominated to the Board of Directors of the Alumni Association which is an honor but which also requires the energy which Bill has plenty of. The Howletts have eight children and since Bill's wife was with him, I infer that they have a pretty good baby-sitter set-up back home. That number of little Howletts puts them in some sort of competition with the Ed Kerwin's whom I thought had the record to date with eight children as of a couple of years ago. Anyway, it is nice to see such solid citizens with good old-fashioned size families.

Dan Greenbaum, on whom we reported in December, has been elected vice president of Madigan-Hyland, Inc., of Long Island City, New York. The firm specializes in large construction projects.—*Fletcher Eaton*, Secretary, 42 Perry Drive, Needham, Mass. 02192

Eric Laimins, '54 (second from right), chief engineer, transducers for BLH Electronics, receiving the Armour President's Creative Science Award. The award went to Baldwin-Lima-Hamilton Corporation for development of the electronic On-Board Aircraft Weighing System (OBAWS). Also shown from left to right are Warren C. Lothrop, Vice President of Armour; Robert O. Bullard, Vice President and General Manager, BLH Electronics; Perry A. White, BLH President, and Donald A. Senour, Chief Engineer-instrumentation.



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William W. Fisk was transferred in August of 1968 to the Central Home Office of Gerber Products Company in Fremont, Mich. . . . **James Bain** is currently employed as a Research Associate at the Ohio State Univ., Defense Research Center. . . . **John R. Bedell** is presently the Techniques Manager of Consolidated Controls Corp. in Bethel, Conn. John is also the Vice President of Howard Institute of Bergen County, Inc., in Hackensack, N.J. . . . This summer, **J. H. Ferguson**, his wife, Patsy, and their three sons, moved from Sheveport, La., to Houston, where Mr. Ferguson is employed by Pennzoil United, Inc., as Assistant to Group Vice President-Corporate Finance. . . . **James A. Miller** continues his association with American Cyanamid as Chief Plant Engineer at their Warners Plant in Linden, N.J. Meanwhile his two children have become young teenagers. The last two summers they have taken camping vacations in the West, sight-seeing from the Grand Canyon to Yellowstone. Next year they hope to camp in the Canadian Rockies. The Miller's love traveling but Jim and his wife are looking forward to traveling without children and taking less exhausting vacations.

Emilio V. Spagnuolo is a Residential and Industrial Building Contractor in Middlesex County, Mass. . . . **Donald W. Ramsey** is a Supervisor of Carburetor Engineering Flow Test, Rochester Products Division of General Motors Corp., Rochester, N.Y. Don was married in 1964. His wife's name is Suzanne. They have a daughter, Laura Lynn, age 3, and a son, Robert Bruce, age one and one-half.

Peter B. Baker of Old Greenwich, Conn., Vice President of Marketing at Republic Foil, Inc. of Danbury, has been elected Chairman of the Containers and Packaging Committee of the Aluminum Association. Mr. Baker joined Republic in 1965 and was appointed to his present position in 1967.

William B. Towles has been with Martin Marietta Corp., since 1951. He is now at their Orlando Division where he is a Senior Staff Engineer working on National Aeronautics Space Administration

space programs. He lives in Windermere, a small town about 15 miles west of Orlando, that is surrounded by lakes. Bill and his wife have three children, 16, 14, and 8 years of age. Tom, the oldest, is interested in engineering and science and may be a candidate for M.I.T. . . . **Charles A. Lusher** is the Manager of Technical Services, Litton Systems, Inc., Lubbock, Texas. He and his wife, Lorena, have a son, Kevin, 10 years of age. Charlie would like to remind **Jack Weaver** that he owes him B. Whitman's address.

Anton de S. Brasunas of the St. Louis Graduate Engineering Center has been elected National President of Alpha Sigma Mu, National Honorary Metallurgical and Materials Engineering Society. He is Director of the Center, which is operated through the University of Missouri, Rolla Extension Division, and is Associate Dean of Engineering at U.M.R. He previously served four years as National Secretary of Alpha Sigma Mu and has just completed a two year term as National Trustee. He lives in Clayton, Mo. . . . **Thomas Howitt, Jr.**, of Corning Glass Works was appointed Director of the newly formed Corporate Development Division. The group will be concerned with operations research, forward planning and external development.

John A. Hambleton, U.S. Air Force Lieutenant Colonel, has been decorated with his third Distinguished Flying Cross at Eglin AFB, Florida. Colonel Hambleton distinguished himself by heroism as an A-1 Skyraider pilot in flight over North Vietnam. Although his aircraft developed a malfunction, the Colonel remained over a heavily defended area to provide cover for helicopters as they rescued three crew members who had been forced to abandon their aircraft over hostile territory. He is now a Fighter Flight Test Officer in a unit of the Air Force Systems Command at Eglin. . . . **Paul Weir** Company, Chicago, Illinois, announces the addition to its staff of **Mr. Martial P. Corriveau**. Mr. Corriveau was formerly Technical Advisor and Director of Commercial Testing & Engineering Company and has previously been associated with U.S. Smelting, Refining & Mining Company, Battelle Memorial Institute, Massachusetts Institute of Technology and Virginia Polytechnic Institute.

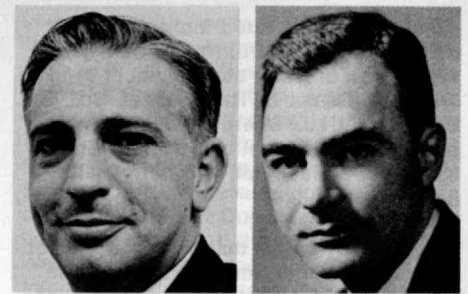
Classmate deceased

We regret to announce the death of **Edward B. Mikrut**, on July 28, 1968 after a short illness. He was an employee of the Perth Amboy school system for the last nine years. During that time, he was a science teacher, Science Department Head and, at the time of his death, Science Supervisor of the school system. Mr. Mikrut served in the Armed Forces during the Korean War. He was also part owner of the B. Mikrut and Son Furniture Company, Perth Amboy. Surviving are his widow, Mrs. Joy Mikrut, a son and three daughters, all at home.

Louis A. Russel, following employment with the Rome Air Development Center, Griffiss AFB, N.Y., and Dynamic Electronics, N.Y., joined the IBM Corporation in 1953. At IBM, he has had technical and managerial assignments in research and development programs on magnetic devices and storage products in Poughkeepsie, N.Y., Zurich, Switzerland, Harrison, N.Y., and Endicott, N.Y. He has been a Senior Engineer since 1961 and is currently Manager of the Advanced Ferrite Memory Products Development Effort, Poughkeepsie, N.Y. . . . **Kenneth H. Olsen**, head of Digital Equipment Corporation, has come long way since 1957 when he and Harlan E. Anderson, a fellow researcher at M.I.T., set up shop in a corner of the Maynard, Mass., woolen mill where the company now occupies close to 1-million sq. ft. Today, its computers are used for such diverse jobs as monitoring steel mill operations, process control in chemical plants, electric power distribution, and typesetting. About half of DEC's output goes to makers of original equipment, who incorporate the machines into process control and analytic systems.—**John T. McKenna, Jr.**, Secretary, 2 Francis Kelly Road, Bedford, Mass. 01730

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Steve Allen, S.M., Sc.D. III, is with the Instrumentation Laboratory at M.I.T. He presented a paper at a Bearing Conference sponsored jointly by the American Ordnance Society and the Thayer College of Engineering at Dartmouth College. The Allens live in Wayland, Mass. . . . **David Bakalar**, Sc.D. III,



John J. Magarian, '52 John P. Ward, '52

another one of our graduate student alumni from the metallurgy department, has achieved prominence as the President of Transatron Electronics Corporation. . . . *Charles L. Baker* left RAND Corporation and is now a Senior Staff Member for International Computing Co., Bethesda, Md. He lives in Potomac, Md., with wife Alice and children Chip, 7, and Cindy, 6.

James H. Banister was made Administrative Vice President of Physics International outside of San Francisco. He has been with the company for three and one half years. His note must have been written while he was traversing the Rockies by bus, but as we decipher it, he has invited those of you interested in piezoelectric or pulse x-rays to contact him. . . . *Christian Bolta* left Atlantic Research a year and a half ago and is now Vice President of Engineering at AMTCO, Inc., developing air pollution control and monitoring devices. . . . *Amar G. Bose*, president of Bose Corporation, Natick Mass., and Professor of Electrical Engineering at M.I.T. has developed a direct reflecting speaker system after ten years of research. His organization is made up of M.I.T. men predominantly, among whom is *Chuck Hieken*, our class agent.

Chuck received an award from the Alumni Association for his great job as class agent. Also among the Alumni Fund awardees classmates were *Charles N. de Vegvar*, Boston special gifts chairman for '51 and *Robert Maurer*, Ph.D. VIII, chairman for Corning N.Y. Chuck is a partner in the firm of Wolf, Greenfield & Hieken, Patent Lawyers, and Bob is Manager, Fundamental Physics Research, at Corning Glass.

David A. Bossen has organized a new electronics company called Measurix Corp., of Santa Clara, Calif. Dave and Doris have four children: Alism 15, Amy 14, Julie 11, and Laura 7. . . . *Romeo G. Bourdeau* and wife Elaine live in Wapping, Conn., with Chris 8, and Carrie 11. Romeo works for the United Aircraft Research Lab in the field of materials research. . . . *Aaron Brody* joined Arthur D. Little, Inc., as Senior Project Leader in the Food and Flavor Section. The Brodys live in Andover, Mass., and have three boys: Stephan 12, Glen 8, and Robyn 5.

Aaron is currently publishing papers, *Systems Integration of Packaging and Fresh Meat Environmental Control*. Prior to joining A.D.L., Aaron was with Mars, Inc. and Whirlpool Corp.

George Butzow is Vice President of MTS Systems Corp., Minneapolis, Minn., manufacturer of electro-hydraulic controls. This is a spin-off from Research, Inc. where George was also an officer. . . . *William Callender* is Vice President, Naval Architecture, for Marine Engineering Systems in Houston, Texas. . . . *Walt Cook* is an electronics research engineer with Foxboro Corporation. He is still skiing, sailing, swimming and flying. The Cooks have two children: Marjorie 13, and Michael 4. . . . *Donald Galinat* is General Manager of Stone Filter Co., a major supplier of oil, fuel and air filters for Diesel locomotives. He and Mary live in Silver Spring, Md.

Paul Gibson is Chief of Cargo and Environmental Research at Boeing's Commercial Airplane Division in Renton, Washington. He lives in Bellevue with wife, Priscilla and sons Donald and Royce. . . . *Daniel Hardie* has been appointed to the newly created position of Administrator for cost reduction/profit improvement at the Aerospace Systems Division of Bendix Corp., in Ann Arbor, Mich. Dan and Mary have four children. . . . *Jack Hathaway* is with the U.S. Geological Survey at the Woods Hole Oceanographic Institute on Cape Cod. He was on the submarine Alvin and picked the location from which the first drilled rock samples were taken from ocean canyons. . . . *John G. Ishikawa*, S.M. X, has been promoted to Research Assistant at the duPont Company's Edge Moor, Del. plant. . . . *Henry Marsh, Jr.*, has been named Manager of Chemical Products and Processing at Owen Corning Fibre Glass Corp., in Granville, Ohio.

Nixon's choice

Charles Miller was awarded the George Westinghouse Award for outstanding ability in improving teaching methods for engineering students. Chuck is head of the M.I.T. Civil Engineering Department and was recently made the Director of the M.I.T. Urban Systems Laboratory, an interdepartmental lab to carry out research on all aspects of urban problems.

Charlie was also tapped by Richard Nixon, shortly after Nixon's election to the presidency, to head a task force on transportation to work out a report to Nixon prior to his assuming office to alert him to the status of transportation and transportation problems in the U.S. This task force, one of ten, examined problems that Nixon felt to be the more important ones facing his administration.

Peter Pilliou, a staff member of the M.I.T. Instrumentation Lab, had a paper published in the *Journal of Spacecraft and Rockets, Effect of Correlated Sextant Measurement Errors on Circumlunar Flight*. We hope that the Apollo 8 crew had a copy of this with them. . . . *Robert L. Richards, Jr.*, S.M., Sc.D. X, has assumed a management position in the industrial products section of the marketing division of duPont in Wilmington, Del. . . . *Bernard Schwartz*, Sc.D. III (Ceramics), is manager of module technology at I.B.M. He was general chairman of the 1968 Electronics Conference of the IEEE-EIA. . . . *Howard Simmons, Jr.*, is on leave of absence from duPont and is serving as the Sloan Visiting Professor in the Department of Chemistry at Harvard. . . . And a final in the academic world, two of our grad student classmates were promoted to the rank of Professor at M.I.T.: *Campbell Searle*, S.M. VI, Department of Electrical Engineering and Emily Wick, Ph.D. V, Department of Nutrition and Food Science.—*Walter O. Davis*, Assistant Secretary, 346 Forest Avenue, Brockton, Mass. 02401; *Howard L. Livingston*, Secretary, 358 Emerson Road, Lexington, Mass. 02173; Assistant Secretaries: *Marshall Alper*, 1130 Coronet Avenue, Pasadena, Calif. 91107; *Paul G. Smith*, 11 old Farm Road, North Caldwell, N.J. 07006

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Lots of items today and without further ado let's begin. *John P. Ward* has joined a new company, Vanzetti Infrared & Computer Systems, Inc., in Dedham, Mass., as Vice President, Electronics and Computer Systems, having formerly served Raytheon, Wayland, as design section manager. The new company plans to work in the evaluation of space age hardware and electronics through the

combination of infrared technology with computer systems. . . . *Robert Summer-ville* is now a senior staff engineer in the Technical Center of The Lummus Co., in Bloomfield, N.J., where he works in process development and plant design in inorganic, agricultural, and petrochemicals.

William Hoey writes that he is still Project Director of Wilbur Smith and Associates on Rotterdam Urban Area Transportation Study, but is currently in London temporarily in order to be closed to the data processing center there. . . . *Samuel J. Cullers* is Chief Deputy State Planning Officer in California, and has just been elected to the board of governors of the American Institute of Planners. He has had wide experience in transportation planning in many capacities with the State of California.

Richard Heitman is returning to the States after four years in London, where he was responsible for developing Arthur D. Little's London Operations Research activity. He and his newly acquired English bride will be in Cambridge, Mass., in the fall. . . . *William P. Chandler* has been Marketing Services Manager for Sinclair Oil Corp., in the General Sales Office in Atlanta, providing services for all Sinclair domestic sales. . . . *J. Allen Morris* is in Alabama doing work for the Army Missile Command at Redstone Arsenal. . . . *John J. Magarian* has been named manufacturing director of Raytheon Company's Components Division in Mountain View, Calif., and is now living in Los Altos, Calif. . . . *Gus Rath* has become Chairman of the Design and Development Center at Northwestern, and has been working on the National Commission on the causes and prevention of violence.

R. Haegler is continuing as Technical Director of Toledo De Brasil, making industrial scales. . . . *William S. Hartley* has his own business in Boston, and is active in local civic affairs. . . . *Ralph C. Stahman* transferred from Cincinnati, Ohio to Ann Arbor, Mich., with the National Air Pollution Control Administration with which he is chief of emission control evaluation of the motor vehicle pollution control division.

Two new arrivals announced

It's a son Gordon to *Stanley* and Jackie *Buchin*, last October, and *Nick* and Nancy *Haritatos* have had a son, Christopher John, this year. . . . And if this isn't mailed now, it won't make the deadline.—*Dana M. Ferguson*, Secretary, Box 233, Acton, Mass. 01720

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Nicholas J. Blazensky is presently assigned to I.B.M.'s New England Field Systems Center as Advisory FSC Representative after returning from a twelve-week course in computer sciences at the I.B.M. Systems Research Institute in New York City. He resides with wife Sandra and four children in Glastonbury, Conn.

Wally Boquist was part of an Edgerton, Germeshausen, and Grier, Inc., team which journeyed to Siberia in September to observe a total solar eclipse. . . . *S. Robert Caso* has joined Marcom Incorporated as a senior consultant in charge of planning and development services for government clients.

Thomas N. Chase, wife Joan, and two sons are enjoying the opportunity of settling down in the Washington, D.C. area. Tom has recently accepted an appointment to the National Institute of Mental Health as chief of the Neurology Unit where he is responsible for a broad range of basic and clinical neuropharmacological research programs.

John S. Clauss is back at Tech as a fellow in the Center for Advanced Engineering Studies where he is studying systems engineering as applied to the flight transportation field. Good luck, John. Maybe you can alleviate the delays in the traffic pattern so common and exasperating today.

Vaughn Dobalian is now in his fourth year at the Massachusetts College of Optometry in Boston. . . . *Richard J. Hayes* has recently been appointed Director of Technical Programs at NASA's Electronics Research Center in Cambridge in a reorganization which increases the center's emphasis on aeronautical research and technology. . . . *Eric Laimins*, chief engineer-transducers, of BLH Electronics, Inc., Waltham, Mass., recently received the Armour Presidents 1968 Creative Science Award, BLH is an Armour subsidiary. . . . *Frederick Rubel* is presently Director of Engineering for the Fuller Co., in Tucson, Ariz. (a wholly owned subsidiary of General American Transportation Corporation). The company designs, manufactures, and sells water and waste treatment equipment.

Joseph B. Scheller is treasurer of the M.I.T. Club of Lehigh Valley, Penn. . . . *Herbert Slater* has been named president of Slater Electric, Inc., Glen Cove, N.Y. He had previously served as executive vice president. *David Springsteen* was recently promoted to Vice President, Energy Division of the Chase Manhattan Bank in New York. . . . *Harry C. Taylor II* is busy teaching at the Technion (Israel) and working. He recently bought an apartment "with an unobstructed view of Judian and Samarian Hills" and welcomes visitors. He reports that *Joe Scheller* and wife visited last spring.

John McNary is one of a team of four from the pathology and Biochemistry Department of the University of Pittsburgh's School of Medicine who wrote in the 22 November issue of Science, "Chemical Carcinogenesis: Persistence of Bound Forms of 2-Flouorenylacetamide."

What the world looks like

Many of us at times would welcome a complete change in our daily lives. *John Goncz* is one classmate who took the initiative and made the change as he relates in the following letter: "After

thirteen years with one company, EG&G, as a senior scientific specialist, a few publications about xenon flashtubes, getting listed in *American Men of Science* and *Who's Who in the East*, I decided with Pat, my wife, that it was the right time in life to see what the rest of the world looked like.

"We landed in Sydney on December 20, 1967. Kaarin was just three, and that date was also Jason's first birthday. Three weeks on the boat with stops at Vancouver, Hawaii, Fiji, and Auckland were good low pressure enjoyment. Then followed two month's of job hunting combined with living in Australian caravan parks and quick introduction to magnificent surf beaches and a few extraordinarily hot days.

"I found an opening with the Division of Land Research, C.S.I.R.O. (Commonwealth Scientific and Industrial Research Organization) in the field of environmental interactions using computer techniques to analyse (lots of) digital field data. A new career for me of course, which I found stimulating and exciting.

"Now, after a year in Australia we have made most of the necessary downward economic adjustment and daily life is no longer so novel. Canberra is private living with a reasonable dose of art, restaurants and films available. Tennis is incredibly well organized and Pat and I play actively all year long. We both passed ski patrol tests, which gives another dimension to our skiing enjoyment. The snow fields are similar to those of New England, but the snow gums in the hot sun form a background that still looks exotic to us. We plan to ski the Cook Glacier in New Zealand this coming (July) winter. Australia offers a more relaxed life, and there is lots of open country left. Business is much more conservative than in the States. Australians are introspective 'American watchers' but they are in no hurry to fully emulate the States. Our address is P.O. Box 689, Canberra City, A.C.T. Australia 2601, and I would be happy to correspond with anyone who wants to hear more of our experiences."

By the time that you read this, you will have received a letter and survey etc., from *Bob Warshawer* on our reunion plans. Please make plans now, and send in your cards indicating attendance. See you there.—*E. David Howes, Jr.*, Secretary, Box 66, Carlisle, Mass. 01741

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The *Harry Schreiber*'s have moved to Reston, Va. Harry is the National Coordinator of Merchandising Management Consulting with Peat, Marwick, Mitchell. Since his office is in New York, they also keep an apartment in Manhattan. (Sounds great). . . . *Ralph Wanger* reports the birth of a daughter, Debra Jane, in October, and tells us that the "two boys are delighted." . . . Talking about boys, *Chan Stevens* writes of Asa Christopher,

born in August, making a total of five boys. Chan is now working on acquisitions for Essex Wire as Assistant to the President. The work involves quite a bit of travel. Since the family spends the summers on Lake Erie Chan is working on the side with a small group developing a line of marine or pleasure boats.

Francis Bonner last August ended a four-and-a-half-year visit at the Institute of Physical Chemistry at Upsala University, Sweden. He is presently employed as a Senior Research Chemical Engineer for Mobil Research and Development Corporation, Princeton, N.J. . . . The **Roy Salzman's** just moved into their dream house in Carlisle, Mass., after almost a year of various trials and tribulations in getting it built. During the winter, Roy was busy with painting, cabinet-making, etc., to put it in livable condition. Occasionally, the family found time to get up to their cabin in Vermont for skiing and well-deserved relaxation. Roy is in the Management Sciences Division of Arthur D. Little and is involved in computer-related consulting.

John and Kathleen Polutchko have been living in Sudbury for almost nine years now, after finishing four years at Wright Field. They have four children, two of each. John has been at Avco Missile Systems Division at Wilmington for the past seven years. He has been transferred recently to the Marketing Department to the position of Manager, Applied Technology Program Development Office. . . . **John Zimmer** writes to us of his and Mary's third daughter, Catherine Anne, born in France in September. . . . **William Menzies** writes from Charlotte, N.C., that he is Vice President and Technical Director of Amicale Industries, Inc. His work is in the development of machinery and systems, primarily for specialty fibres such as cashmere. Bill and Jean have three children, two girls and a boy.

John Gahrman reports the birth of his sixth child, Beth Marie, in September. Since last December, John has been associate with the management consultant firm, Worden and Risberg, in Philadelphia. In case John feels that there is a record involved here, we are pleased to announce that your editors also received a card from **Phil Untersee** telling of Susan Teresa who arrived in May, which actually puts Phil ahead of John by a few months. Phil now has four girls and two boys.

Ashton Stocker has been named Vice President of Operation of Instrumentation Laboratory, Inc., in Lexington. The company manufactures medical electronics equipment. As was formerly Manufacturing Manager of Ranco, Inc., Wilcolator Division, Elizabeth, N.J. He and Sue and the two children are now living in Andover, Mass. . . . Also living in Andover is **Frank Buck**. He is working for New England Nuclear Corp., in Boston, as a Senior Chemical Engineer. Frank manages the Luminous Products Group and is involved in the development of special radioactive sources.

Richard Dangel is now Section Head of Integrated Logistics Support Implementation for the Naval Systems Command in Washington. . . . **Gordon Lohman** has been appointed President of the Amsted Research Laboratories in Bensenville, Ill. The Laboratories are the corporate research arm of Amsted Industries. Gordon has been with Amsted companies since 1958, holding various engineering and metallurgical posts, and became Director of Research in January of 1967. He and Jo Ann and their two daughters live in Glen Ellyn, Ill.—Secretaries: **Dell Lanier Venarde** (Mrs. J. H.), 16 South Trail, Wilmington, Delaware, 19803; **L. Dennis Shapiro**, Aerospace Research, Inc., 130 Lincoln Street, Boston, Mass. 02135

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Donald Block has left Redcor to become director of project management at Astrodats. His wife, Gail, has started an inventory service business called Incon Systems. . . . **Phil Bromberg** indicates that he is still a fellow at the Mellon Institute and Assistant Professor at Carnegie Mellon University in Pittsburgh. . . . **Dick Degenhardt** writes that since graduation he had worked for Chrysler Corporation Missile Division in Detroit and Huntsville for three years and has now spent nine years with General Electric Ordnance Systems in Pittsfield working on Fleet Ballistic Missile guidance systems. Specifically he is on the Poseidon project which means frequent trips to Tech's Instrumentation Lab. Dick and wife (Ruth Toombs) have two daughters 8 and 10 and the family enjoys skiing in the Berkshires.

Chuck Gorman has been appointed director of purchases of Rogers Corp., in Rogers, Conn. Chuck holds an M.B.A. from the U. of Rhode Island. The Gormans have two sons, David and Jeffrey. . . . **John Hartigan** writes that he has been working for the brokerage firm of Smith, Barney & Co., in their Hartford office since 1960. John and his wife (Virginia Newton) have two children. . . . **Hank Hebel** spent several years on Boeing's AGM 69A missile program and is now Deputy Program Director of the Company's work on the Navy ASMs. . . . **Bob McKelvey** spent over six years with General Electric's Missile and Space Division-Manager of Management Practices, Biosatellite Program, but is now Director of Business Planning, University City Science Institute, a nonprofit organization which promotes R&D in the Delaware Valley. Bob and his wife (Audrey Kelly) have four daughters, Susan, Karen, Michelle and Diane.

Bill Peter writes that he is now in nylon manufacturing at duPont's Richmond plant after working in research, marketing and other areas of the company. Bill's family includes four children. . . . **Dr. Dave Quigley** completes his residency in orthopedic surgery at Rhode Island Hospital in June. . . . **Wendy Reis** has been promoted to Assistant to the President of Sprague Electric. . . . In case

you missed the Apollo 9 launch, **Russ Schweickart** was there as the Lunar Module Pilot. . . . **Dave Shefrin** is President of Computer Systems & Education Corp., the parent company. . . . **Andy Viterbi** is Associate Professor at the School of Engineering and Applied Science, U.C.L.A., and author of *Principles of Coherent Communication* published by McGraw-Hill in 1966. He is also Western Vice-Chairman of the IEEE Information Theory Group. . . . The **Dick Millers** announce that a third child, a daughter, arrived on October 9, 1968. . . . **Dr. Steve Newman** is a urology specialist (applied fluid dynamics) in St. Petersburg. The Newmans have two sons, Mike and Ted, and Pam is expecting a new addition shortly.—**Bruce B. Bredehoff**, 16 Millbrook Road, Westwood, Mass. 02090; **T. Guy Spencer, Jr.**, M.I.T., Room E19-439, Cambridge, Mass. 02139

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I ran into **Fred Jaggi** at the M.I.T. Club Luncheon in London a few weeks ago. Fred is a Process Consultant with Stone & Webster. He and his English wife have two-year-old twins. They are enjoying very much living here in England, except that after having gotten used to central heating in the States, his wife finds she is freezing to death. . . . **Bob Murphy** took me to lunch back in late November. Bob is working with Esso Europe in London. He and his wife Valerie now have three children and are living out in the country. . . . **Jim Alstrom** writes that he is in his fifth year with Eaton Yale & Towne Research Center. He recently developed and implemented a computerized new product and research program evaluation system. He is still landscaping and completing the details of his home in Quakertown. He writes: "Jane and I are quite happy among the hills and trees and our two-year-old son is really a lover of the outdoors. I am always busy, studying psychology and chairing the local Youth Guidance Committee and running pledge campaigns for our church. New responsibilities as Chairman of the Board of Trustees of the Unitarian Church will keep things active for the next year."

Dick Packard is now a staff scientist at NASA Electronics Research Center. His area of specialty is semiconductor infrared detectors. He writes that he is now engaged in materials and device development, IR detectors, in The Optics Laboratory. Dick won the National (U.S.) Masters Marathon Championship in San Diego in July and was second in the National Masters Cross Country Championships in October.

Bary Saltzman indicates that as of September 1968, he has been Professor of Geophysics at Yale University. A newspaper clipping on Barry's appointment indicates that he will "open a major area of studies in geophysical fluid dynamics, and will be able to interact with other specialists at Yale in physical oceanography and solid earth geophysics." Also

the article notes that Barry comes to Yale from the Travelers Research Center, Inc., where he has been a research fellow in planetary dynamics since 1961. . . . *Philip Presser* outlined his situation as follows: "Married, 1963; two girls; 1 boat; Staff Engineer at TRW Systems. . . . *Charles L. Murray* advises that he is now an Associate in the Department of Internal Medicine at the Geisinger Medical Center, Danville, Pa., with an interest in Oncology. . . . Also engaged in the medical field is *Joel Schiffman*. He writes that he is now in active practice of Orthopaedic surgery in Alexandria, Va. He received the Diploma of the American Board of Orthopaedic Surgery in January 1968.

Jim Emerson is in his third year of teaching at Wentworth Institute. . . . You will remember the article on *Charles Koch* in an earlier issue. *Jim Cunningham* in a brief message gives us the following information: "I have been working with Koch Venture Capital, Inc. (William & David Koch, '62 and Charles Koch '57) as Executive Vice President. We have been investing in some exciting companies and look forward to more in the future. The funds of the Class Treasury are not involved, for they reside safely in a savings bank." . . . *Ralph Warburton* dropped me a letter to report that a publication, *New Concepts in Urban Transportation Systems*, for which he was Guest Editor for the *Journal of the Franklin Institute* was published in November. It covers major new mass transportation planning and design developments in the U.S. Ralph added that he and Carol were the happy parents in July of a baby girl. They also have a son.

Albert Klainer writes: "After spending two years at the U.S. Army Medical Unit, Walter Reed Army Medical Center, Ft. Detrick, I joined the faculty at Ohio State University College of Medicine as an Assistant Professor in the Division of the Department of Medicine. My wife Jo-Ann and I have two children, a boy and a girl. . . . *Bill Walsh* has recently had a very fine promotion with Mobil Oil Corporation. He will become Assistant to the President of the Corporation and a Secretary of the Executive Committee. *Robert Rosin* writes, "After four years at Yale, I have recently joined the faculty of the Department of Computer Science at the State University of New York at Buffalo as Associate Professor and Vice Chairman. At present Rosalie and I have one girl age three."

Paul Wood's note reads as follows: "I am now designing aerospace computers for NASA (Electronics Research Center in Cambridge). Recently, I completed a graduate level textbook titled *Switching Theory* which was published in the Spring of 1968 by McGraw-Hill. I have two children. My wife, Bette, teaches reading in the Newton Public Schools." . . . *Selden Saunders* is attending the University of Virginia Graduate School in Aero/Space Engineering. He is full time on a University Fellowship. . . . *Robert Barnes* completed his Ph.D. in

Logic and Methodology of Science at Berkeley in 1965. He is now Associate Professor of Philosophy at Lehigh. He was recently active in the McCarthy for President campaign as Northampton County (Pa.) Chairman. . . . *Howard Schumacher* writes, "Unlike most of our businessmen/teachers in the class, I'm still pursuing engineering. I'm now the senior engineer at Dynalec Corp., in Rochester N.Y. Not much chance to embezzle a fortune, but a pure life."

A note from *Morton Rosenstein* stated that from December 2, his new position would be Marketing Research Manager for AVCO Computer Services in Wilmington, Mass. *Gerald Sapers* writes that he is now a resident of Philadelphia, having joined the staff of the Eastern Utilization Research & Development Division of the Agricultural Research Service, U.S. Department of Agriculture, in July 1968.

Finally a note from *Dominick Fortunato*: "I received my M.S. in Metallurgical Engineering from Illinois Institute of Technology in Chicago in January 1968, and moved back to my home state of New Jersey with my wife, Loreta, and our daughter. I am now Project Engineer with the Howmet Corporation in Dover, N.J., working in the production of Super-alloys for the corporation's casting plants.—*Frederick L. Morefield*, Secretary, 18 Whaddon House, William Mews, London, S.W.1., England

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Although your secretary let February lapse, you gents and gals did not, so that here we are in March with a flood of letters. The first comes from *Earl Rose* who writes: "Am now marketing coordinator at Ocean Spray Cranberries, Inc., with responsibility for all sales and marketing functions with the operations staff and facilities. I have also been elected chairman of advisory and finance committee in Plymouth, Mass., an activity which involves reviewing and recommending budgets to the town meeting—no pay and you're always wrong, but great fun. Wife Barbara and four kids are very busy doing *their* thing in the community. Still pursuing a side career in music as organist and choir master in a local church and am also learning to play the guitar—classical method—very tough!"

The second letter comes from *Dick Procutner* posted dated, surprisingly, from the United States. "The other pastures always look greener. After a six-year tour of the world, centered around my appointment at the University of London, I can now affirm from my own experience that the most satisfying way of life is as a research scientist with a large firm (Lockheed). Children—John 7 and Nancy 4, and their parents are looking forward to living happily everafter in Palo Alto." We also received a note from *Warren Heimbach* who reports that he is still on assignment there with Mattel's English

subsidiary, Rosebud-Mattel Limited, of which he has recently been appointed managing director.

Phil Friend is with Control Data Corporation as manager of product management for the Data Management Systems Division. Phil, his wife Polly, and their three children live in the Woodland Hills area of Los Angeles with a note that "it's the greatest." . . . *Merle Persky* sent us a notice that his wife Phyllis has recently presented him with their first child a boy, Michael Alan. . . . And, to carry on the family banner, *David Nixon, Jr.*, reports that David Scott Nixon, III, will be one year old this month. He and his family are living in West Concord, Mass. . . . *Richard Rosenthal* is living in Lexington, Mass., with, as he puts it "a lot of other Tech graduates. Wife Pat and I now have two children, Pam and Mark aged three and two. I have recently joined the Polaroid Corporation as a senior optical engineer in their applied optics division. Last spring I also finally sold the rights to a record cleaning device I had patented, and am now happily collecting royalties."

Walter Braun is now working as a physicist in optics at the National Environmental Satellite Center in Washington, D.C. . . . At G.E.'s missile and space division in Valley Forge, Pa., *Vic Klemas* has been appointed manager, space physics. In November he presented a paper, *Comparison of Imaging Sensors for Mars Orbiter*, in Washington. Also, he is currently serving on the University City High School curriculum committee which is a volunteer subcommittee to the Philadelphia School Board. . . . *Ronald Nece* is currently a professor of civil engineering and director of the C. W. Harris Hydraulics Laboratory at the University of Washington. . . . *Richard Murdock* is now working for G.E. as engineering specialist in their polycarbonate resin plant in Mount Vernon, Ind.

Out at NASA's Goddard Space Flight Center, *Michael Balderston* writes that he has been busy developing satellite data handling systems, but since he also writes that they now have four children and are expecting a fifth, I suspect that the real application for the data handling system is at home. . . . *Robert Lofgren* has recently assumed the position of sales manager for F.A.G. Bearing Corporation, the U.S. division of a German headquartered company. He will be relocating to Joplin, Mo., next summer when the corporate headquarters and manufacturing plant for the United States are completed.

A letter arrived from *Robert Wilcox*, who is stationed in Rio de Janeiro as scientific representative for the U.S. Atomic Energy Commission, and it contained a rather unusual birth announcement for their newest daughter, Heather, who weighed in at 3½ kilos. He and his wife, Doris, have three other children, Susan 11, Janet 9, and Bobby 8. He also writes that "my liaison territory also includes Colombia, Venezuela, and Ecuador in

addition to Brazil. In Colombia, my principal contact now is another M.I.T. nuclear engineering graduate, Capitan de Corbeta Hernan Ramirez Yusti, '60, of the Colombian Navy, who has recently been appointed the executive director of the Institute of Nuclear Affairs in Bogotá."

Joseph Gal is now chairman of Interactive Data Corporation, a newly formed computer company in Waltham, Mass. He, his wife Toni, and two children, Jonathan and Christian, have moved from New York City to Prides Crossing, Mass. . . . *John Williams* has assumed the presidency of Wales-Beach Corporation as of this past October. In addition he serves as president and board chairman of Rockford Plate-Right, Inc., and Ardee Metals Corporation, all of Rockford, Ill.—*Michael E. Brose*, Secretary, 1171 North Street, Walpole, Mass. 02081; *Antonia D. Schuman*, 22400 Napa Street, Canoga Park, Calif.

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Bob Larson wrote a very nice long letter catching me up on everything he's been up to since 1960 (well, almost everything): "After leaving M.I.T. I headed west to Stanford University, where I received an M.S. degree in June 1961 and a Ph.D. in April 1964, both in electrical engineering. I then took a position as a Research Engineer at Stanford Research Institute, Menlo Park, Calif., where I remained until June 1968. I am presently with Wolf Management Services of Palo Alto, California.

"In June 1964 I married Susan Rollefson of Tacoma, Wash., a Stanford graduate. We live in Los Altos, Calif., with our two daughters, Carrie Ellen (age 2) and Cindy (age 4 months). My professional career has been in the field of theory and application of modern control theory. I have written over 40 technical papers and one book, *State Increment Dynamic Programming* (American Elsevier Publishing Co., N.Y., 1968). My paper "Dynamic Programming with Reduced Computational Requirements" won the IEEE Group on Automatic Control best paper award for 1965. This year the American Automatic Control Council, composed of representatives from the IEEE, AIAA, AICHE, ASME, ISA and other societies, presented me with the 1968 Donald P. Eckman Award for outstanding contributions to the field of automatic control. I am currently a member of the Administrative Committee of IEEE Group on Automatic Control, Chairman of the IEEE Discrete Systems Committee, and IEEE Delegate to the Joint Automatic Control Conference Program Committee."

Bruce Silberg wrote, too—with a "brief recapitulation of my activities in the last, fateful, three and one-half years. Prior to Memorial Day of 1965, I was living and working in the Cambridge area. During that vacation, I again participated in a Sports Car Club of America 'road' race. During that event I was involved in a seri-

ous accident. Was transported back to New Jersey for treatment. My rehabilitation, which proceeded until 1967, involved relearning even the most elementary motor activities. In short, I am again living in New Jersey and working in New York City. Have you heard the advertisement: 'You'll find a banker at Bankers Trust'? Well, you'll now find Bruce Silberg at Bankers Trust as a programmer/analyst."

Congratulations are in order all around. And we should add to that diverse set of accomplishments those of *Lawrence Kravitz*. He has just completed an Ordnance Officers Advanced Course at the U.S. Army Ordnance Center and School, Aberdeen Proving Ground, Maryland. . . . *R. R. Townsend, Jr.*, reports that he and his wife Linda (Robertson formerly of Vienna, Va.) are living on the beach in Riviera Village, and thoroughly enjoying southern California. He is a Systems Analyst—Defense Information Systems with TRW Systems in Redondo Beach. He and Linda were married in Las Vegas on December 31, 1966. From 1958 to 1966, Roger was an Engineering Aid, Junior Engineer, Programmer, Senior Programmer at the Electronic Warfare Lab., Melpar, Inc., Falls Church, Va. (I assume that he was all of those things in some order and not all at once.)

Colonel *Giles Evans* is Manager, Florida Canal Authority, the local sponsoring agency for the cross-Florida barge canal now under construction. . . . From *Joseph Goldstein*: "Since I left M.I.T. in 1964 with an Sc.D. in metallurgy I had been employed by NASA at the Goddard Space Flight Center in Greenbelt, Md. There I was pursuing research on the origin of meteorites. This September I entered the academic world as an Assistant Professor at Lehigh University, Department of Metallurgy and Materials Science. My wife Barbara and I have a two-year-old son Steven."

Francis O'Brien has "established capital budgeting procedure for the City of Boston in 1965. Authored Boston's first three annual capital budgets—1965, 1966, 1967. Involved in space programming, site selection, cost estimating and architectural contracts for twenty new city buildings, including the new 5,000-student campus high school, as a beginning in replacing Boston's outmoded plant. Since 1967 I have been Director of Planning at the University of Massachusetts, Boston, increasing plant to keep ahead of a 1,000 student/year growth, while looking for a new permanent site for a new \$350,000-\$400,000 campus."

Bob Stengel received his Ph.D. in aerospace and mechanical sciences from Princeton in June. He is now a member of the M.I.T. Instrumentation Lab Research Staff, working on the Apollo Lunar Module Digital Autopilot. . . . *Sue Schur* recently received a second place award and an honorable mention for promotional literature which she had prepared for two clients in the annual NAIA exhibit. Sue was re-elected Chairman of the

Boston Section of the Society of Women Engineers. . . . *Martin Wohltmann* is a Staff Engineer in the Dynamics and Loads Group with Martin-Marietta, Orlando Division. . . . I've got more news, so watch this space next month. Send your family secrets and innermost thoughts to—*Linda G. Sprague*, 10 Acorn Street, Cambridge, Mass. 02139

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Tufts University, Medford, Mass., awarded a Ph.D. from the Graduate School of Arts & Sciences to *Richard E. Phillips*. . . . *Andrew S. Kahr*, who has been Assistant Professor of Business Administration at Harvard since 1963, has recently been appointed Associate Professor of Business Administration at Harvard. . . . *Robert L. Knighten* was appointed Assistant Professor of Mathematics, to begin September 1, 1968, at the University of Chicago, where he has held a position as Instructor since 1966. . . . *George N. Krebs, Jr.*, presently a teaching assistant at Rutgers University where he earned his M.S. degree and is now a candidate for a Ph.D., will join the Marietta College, Ohio faculty in February, 1969. . . . R.C.A. recently announced the appointment of *James M. Osborne* as Manager of Marketing for R.C.A.'s Defense Communications Systems Div., Camden, N.J. . . . *Harold B. Shukovsky*, a physical metallurgist, has joined the research staff of R.C.A. Labs at the David Sarnoff Research Center in Princeton. *John R. McAllister*, Division Vice President, R.C.A. Aerospace System Division, Burlington, Mass., also announced in mid-year 1968 that R.C.A. received a \$7.4 million U.S. Army contract to produce automatic test and repair equipment for in-the-field support of surface-to-surface tactical missile systems. McAllister reports that the effectiveness of the weapons system in this program will be greatly enhanced in reliability with the R.C.A. produced Land Combat Support Systems of testing.

French Hospital in San Francisco has asked Lockheed Missiles & Space Co., for a computerized business office service. Lockheed's work with French is being performed by the company's Information Systems organization, headed by *Kenneth T. Larkin*. The organization has applied aerospace data systems techniques to problems of state and local government and education as well as to hospitals.

Humble Oil & Refining Company's Bayway Manager has announced the transfer of *Randall Kunz* to Business Analyst in the Controller's Department of Esso Chemical Co., Inc., New York. In his new position, he will be responsible for interpreting the world-wide financial performance of a group of product lines within the chemical business. . . . *Gerald L. Gottlieb* writes that he was married on June 11, 1968 to Miss Emily Ackerman. . . . *Jon A. Davis* (Ph.D. 6/68) moved to Jacksonville, Fla., in March, 1968, with his wife and son, and is now

assistant to the President for a construction firm, Archie Davis, Inc. . . . **John R. Buta** obtained a masters in engineering at the U. of Akron in February, 1967 and since then has been promoted to Project Engineer with the E. W. Bliss Co., in Salem, Ohio.

Richard P. Laeser is now employed at J.P.L. as project engineer for Mariner 1971, and also reports that he and his wife are proud parents of Holly Marie, born January 10, 1968. . . . **William Mihaltse**, who is employed by I.B.M. in New York City as an account representative, reports that he was married this past October 5 to the former Diana Kerry in Rye, N.Y. . . . **Edward A. Feustel** writes that he saw **Kenneth W. Gentle**, who is Assistant Professor of Physics at the University of Texas in Austin. Ken has a large experimental apparatus and will begin to take measurements shortly, and this activity should keep him busy for several years. Hmm, wonder what he is measuring. . . . **Alexander Bogan, Jr.**, has returned to Long Island and is working as a research scientist at Grumman Aircraft.

Eugene F. Finkin fills us in on his activities with a report that he received his Ph.D. in mechanics from Rensselaer in 1966, and since then has been a Senior Engineer/Scientist at McDonnell Douglas Corp., in Santa Monica. He is Secretary of the A.S.M.E. Space Lubrication Committee; Secretary of the A.S.L.E. Gears and Gear Lubrication Commission; and Vice-Chair of the A.S.M.E. Friction, Wear, and Boundary Lubrication Commission. . . . **Patrick C. Fischer** will be visiting Professor during the 1968-1969 year in the Department of Applied Analysis and Computer Science at the University of Waterloo in Ontario.

Michael R. Terry will be continuing work toward his Naval engineering degree at M.I.T. in June, 1969.

Melvin B. Weiss, who has just finished his internship at Kings County Hospital, Brooklyn, N.Y., is now satisfying his military obligations as a member of the U. S. Public Health Service. . . . **R. Gary Helmig**, who joined the I.B.M. family in 1968, reports an addition to his family—Timmy, born July 17, 1968, who joins his brother Ricky, two-and-a-half.

Judith Selvidge, is now a student in the Doctoral program at Harvard Business School. . . . **Philip H. Nelson** is now working as a research geophysicist for Kenecott Exploration Services in S. L. C.

David Vilkomerson, who is working in holography and computers at David Sarnoff Research Center, RCA Labs, Princeton, N.J., and on a doctorate at Columbia, was awarded on October 4, 1968, an "IR 100" award, given each year for the 100 most significant technical developments of the year. The award was given for a holographic memory, for which he was project leader—**Gerald L. Katell**, Secretary, 310 Hoge Building, Seattle, Wash. 98104

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This month we will report results of the class questionnaire filled out for our class reunion. The number of replies to a given question ranged from 160 to 225. All percentages are rounded off and thus will in general not total 100%. Categories with a small number of replies or insignificant correlations will be omitted.

First, questions dealing with occupation. There were fifteen occupations from which to choose. Research is most popular with a 39 per cent involvement followed by development, 14 per cent; management, 11 per cent; other technical, 8 per cent; teaching 5 per cent; and military 4 per cent. The high percentage listing research to some extent reflects the large number of classmates continuing their education at the time of the questionnaire.

Next is the long awaited salary figures. If you consider these figures a measure of our success just wait until everyone graduates. Meanwhile 32 per cent report earnings of less than \$8000; 25 per cent-\$8000 to \$12,000; 25 per cent-\$12,000 to \$14,000; 11 per cent-\$14,000 to \$16,000; 5 per cent-\$16,000 to \$18,000; and last, 2 per cent report over \$25,000. Everyone reporting an income in excess of \$25,000 listed finance as their occupation. It appears that finance is where the money is. This statistic should greatly reduce the cracks about Course XV. Of the over \$25,000 group, half had cums over 3.5, half under 3.5, i.e., it makes no difference what-so-ever.

There were questions dealing with the number of people under your supervision: 54 per cent had none, while 40 per cent supervise 1-5. Slightly over 1 per cent supervise over 50. Only 2 per cent of those replying at this point own their own business. Yet interestingly 32 per cent stated that they preferred working for themselves. With the current Wall Street hysteria over owning stock in embryonic high-technology industries, we should get busy and increase the 2 per cent figure. As for other work preference 37 per cent listed private industry, 29 per cent universities, and 2 per cent government. Thus far 59 per cent have held one job, 30 per cent two jobs, 8 per cent three, 2 per cent four, and 2 per cent have been very mobile holding over five jobs. Let's see, five jobs with a 15 per cent increase at each change comes to. . . .

New England is far ahead as home of the Class with 35 per cent of the Class here followed with 16 per cent for N.Y.-N.J.; 14 per cent Central states, 14 per cent West Coast; and 12 per cent Pa.-Mid.-D.C.

Apartments are home for 64 per cent of the Class, while 15 per cent prefer to rent homes, 17 per cent own a home. These dwellings are occupied by bachelor classmates 30 per cent of the time, married classmates in 70 per cent of the cases and divorced classmates in less

than 1 per cent of those replying. The Class has been eating well as evidenced by 42 per cent reporting an increase in weight since graduation while only 9 per cent report a loss; 48 per cent were able to maintain their weight. Of those gaining weight slightly over 1 per cent gained in excess of 25 lbs. Weight change was correlated with wives' education. (Why I will never know.) There were some interesting results. Scanning the column of those losing weight the highest correlations with wives having a high school education only. But wait. The next highest correlation in the losers column was with wives having a Ph.D! I will be happy to publish anyone's analysis of why this should be the case. There was no significant correlation with other levels of education. Of those gaining weight there was only one correlation of significance. Namely of those gaining over 25 lbs. There was appreciable correlation with wives who are registered nurses. If some of the R.N.'s will write in their secrets perhaps I can pass them on to the wives of those losing weight—**Martin Schrage**, Secretary, c/o E. G. and G., Inc., Crosby Drive, Bedford, Mass. 01730; **Michael Bertin**, Regional Reporter, Department of Physics, Stanford University, Palo Alto, Calif. 94301; **Henry Bowman**, Chicago Regional Reporter, Federal Reserve Bank, 230 S. La Salle Street, Chicago, Ill. 60604; **M. Lifschitz**, Washington, D.C. Regional Reporter, National Institute of Health, 5333 Woodward Avenue, Bethesda, Md. 20014; **Frank Model**, New Jersey Regional Reporter, 47 Ethan Drive, Apt. 1, Murray Hill, N.J. 07971

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I hope that you are all preparing for our first reunion this June. Questionnaires were sent out to all classmates concerning the reunion a couple of months ago. If you have any questions, write to **Robert Scott**, Reunion Chairman, Department of Engineering, M.I.T.

Class Heroes

This month produced two Class Heroes, both of whom wrote letters to the secretary. One of these is **Joe Kasper**, who also wins oak clusters because he included news of other classmates. Joe received his Sc.D. in instrumentation at M.I.T. last June, and is now working at the Analytic Sciences Corp., in Reading, Mass. The Kaspers are living in Watertown, have added a parakeet to the family, and are looking forward to Pat graduating from B.U. this year. Joe reports that **Bill O'Halloran** is also working for Analytic Sciences Corp., and that Bill and his wife Cheryl have bought a house in North Reading. Joe has also been in contact with **Jerry Weiner**, who is living in Fort Worth and is planning to come to the reunion in June.

The other Class Hero is **Marlyn Pettit**, who is working in international capital and currency management for Chrysler. He expects to be doing a lot of traveling soon. . . . I also wish to thank **Jerry**

Luebbers, Ron Randall, Bob Scott, and Robert St. Aubin for sending Christmas cards in December. Ron Randall, by the way, reports that he is now out of the Army and is developing new educational systems at the Westinghouse Learning Corporation.

Mark Alpert received his Ph.D. in marketing from the U. of South California last September, and is now an assistant professor of marketing at the University of Texas. . . . Lieutenant Commander Franklin Alvarez completed his year in Vietnam with the Navy R&D unit last November, and is now assigned to the San Francisco Bay Naval Shipyard. . . . Barbara Cohen reports that she has become active in the M.I.T. Alumni Center in New York. She was the editor of the fall newsletter, which she found very enjoyable. . . . James Craig has received his Sc.D. in aero at Stanford, and is now an assistant professor at Georgia Tech. . . . William Euerle is working with the power system engineering group at M.I.T.

Conrad Grundlehner is writing his doctoral dissertation at the U. of Pennsylvania. . . . Robert Hempstead is also working on his thesis, this being in physics at the U. of Illinois. . . . Barry Holmes, S.M.'64, was awarded the first Gillette Fellowship in Metal Forming last year. Barry works in the Department of Metallurgy at M.I.T. . . . Leon Kaatz has moved to Washington D.C., where he is an analyst for the Center for Naval Analyses. His wife Jane teaches high school in Falls Church. . . . James Keenan has become a vice president at Goodyear Aerospace Corp. . . . Clarence Malick is now in his first year at Harvard Law School. . . . Robert McKean is working on his Ph.D. in math at the U. of Wisconsin. He was married to the former RaeLynn Reickert, Radcliffe '68, last June. . . . John Meriwether has received his Ph.D. in space physics, specializing in optical emissions. John reports that Mel Oliven and his wife were expecting their first child back in the fall.

Gary Owen is working as a research economist for Travacon Research, Ltd. in Calgary, Alberta. . . . Anthony Robinson received his M.D. last June from N.Y.U. He is now interning at Metropolitan Hospital, and expects to begin psychiatry residency at B.U. in July. . . . Raymond Smith is a staff architect at Day & Newman in Austin. His wife Cecilia gave birth last summer to their second child, Rachel Lynn. . . . David Spencer is a senior engineer for E.G.&G. in Bedford. He was married last September to the former Pamela Katz of Brookline. Pam is working toward her Ph.D. in psychology at B.U. . . . Jay Tennenbaum is working on thesis research at Stanford, and also doing information retrieval for Lockheed. . . . Francis Tuggle is assistant professor Business Administration and Computer Science at the U. of Kansas, and is still pursuing his Ph.D. thesis at Carnegie Tech. . . . Let's all plan on being at the reunion.—Ron Gilman, 1021 Oakmont Place, Apt. 8, Memphis, Tenn. 38107

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After finishing up at the Harvard Business School, Roddy McLeod is learning the ways of small business in Salem, Va. . . . John Krause is currently attending Catholic University in Bladensburg, Md., working on his Master's in ocean engineering. The Krauses had their first child, Jessica Lynn, last September. . . . Jim Hester has one more year to go on a Ph.D. in urban planning at Tech. . . . Ralph Cicerone and his wife, Carol, are both working on Ph.D.'s at the U. of Illinois.

Bruce Zotter is working in reactor plant analysis at the Knolls Atomic Power lab in Schenectady, but is making very frequent trips back to Boston. . . . Bary Pollack is finishing his dissertation work in graphics at Stanford. . . . Frank Yin reports his marriage (September '66) to the former Miss Elaine Jong; he is now working on a Ph.D. in bioengineering at the U. of California in San Diego, having finished his Master's in aeronautics at M.I.T.

John Edgar is currently on active duty with the U.S.A.F. doing system management work at the Space and Missile Systems Organization in Los Angeles after graduating from Tech in June, 1968, with an Engineer's degree in aeronautics. . . . Dave Moran is doing research in ship hydrodynamics at the Iowa Institute of Hydraulic Research. Dave expects his Ph.D. in Hydraulics from the U. of Iowa in 1970 and reports the birth of a son, Scott, in September. . . . John Beckmann is now in charge of the Financial Planning Department, Aerospace Systems Group of Westinghouse, directing investment analysis of government contracts. . . . Art Bushkin is working on a Ph.D. in computer science at M.I.T. and is also an Instructor in Computer Science at Wellesley under the M.I.T.-Wellesley combined program. . . . Ed Hoffer reports the end in sight at Harvard Medical School and that he's now the proud owner of a year-old St. Bernard.

Wayne Wilner has indeed found the land of plenty in Palo Alto with a cooperative arrangement he's worked out between Stanford U. and the Burroughs Corporation. . . . Major John Ruth is currently an Assistant Professor at the U.S. Air Force Academy and was a visiting assistant professor at Tech during the summer of 1968. . . . John Currano is now a Ph.D. candidate at the U. of Chicago and is engaged to Miss Diane Semlow of Evergreen Park, Ill., with an August wedding planned. . . . Peter Bird is a 2nd Lieutenant in the U.S.A.F. and received his pilot's wings at Webb AFB Texas.

Frank Weigert corrects an earlier class note to read that he is with duPont but in Wilmington, Del. . . . Marion Mitchell finished his active tour of duty with the U.S. Army and is now with the R&D group at the Southwire Company, Carrollton, Ga. . . . Peter Skelly is in Seattle with Boeing and is working on a Ph.D. at the

U. of Washington. . . . Steve Gray is finishing up Ph.D. work in physics at M.I.T. Po Mar is the Director of Management Science, Advanced Computer Techniques, New York City. His wife is the former Miss Christine Wong, Barnard College, and they are expecting their second child in April. . . . Steve Scott completed his Army service in June after a tour in Vietnam and is now working on an M.B.A. at the U. of Chicago.

Dave Trevvett is at the U. of Maryland doing Ph.D. research in high energy (bubble chamber) physics. . . . Frank Shaw married the former Miss Julie Cole in August, 1967, and is now serving as Lieutenant (j.g.) in the U.S. Coast Guard. . . . Ron Weiers is an Instructor in the School of Business Administration at Duquesne U. in Pittsburgh. . . . Bill Samuels wrote that he completed a stint in the Army and is now studying for the Washington, D.C., bar exam. . . . Bob Neff and his wife, Sue, are living in Providence where Bob is a data processing consultant. . . . Finally, Mike Keehner is currently the manager of the Systems Engineering Department for General Dynamics.—Jim Wolf, Secretary, 24455 Lake Shore Boulevard, Euclid, Ohio 44123

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I recently received a letter from Dick Gauthier, a fellow Peace Corps Volunteer in Africa. I believe that he wrote the letter last summer, but that it was delayed at my old address in the states. Dick writes, "Having decided to separate myself from the academic life for a while, I joined the Peace Corps. I've just finished my first teaching year in Ghana; I teach physics at five different levels, and I'm enjoying it thoroughly. This summer I'll spend a month in East Africa, and I may decide to return to the United States next year via Japan. Best regards to all." I plan to do some travelling myself next summer during my month-long Peace Corps vacation. I plan to travel south from Morocco, so maybe I'll see you in Nkwatia-Kwahn, Ghana, Dick. I have found that travel is one big plus for the Peace Corps, nonmilitary travel, that is.

I just heard from Ron and Jane Gomes-Casseres in Curacao, Netherland Antilles. They were married last June; since then Ron has been working in a new manufacturing plant as a Senior Production Planner for Texas Instruments. Other than the smell from a nearby refinery the work is remote from Chemical Engineering, but he likes the job. . . . John Fittz is working on the full-time staff of Campus Crusade for Christ on sixteen campuses in Kansas. John has found his M.I.T. and fraternity background very useful in gaining a hearing among campus leaders. Especially rewarding is the time he spends with Negro and international students. He writes that the response has been tremendous. . . . Jerry Siegel married Miss Kathy Eisenstein, a 1968 graduate of Barnard College, in June of 1968. He is in the Ph.D. Program in Operations

Research at Cornell. . . . *Bruce Greenwald* attended the Army ROTC summer camp at Fort Benning, Ga., with his unit from Princeton University. He received six weeks of training in leadership, rifle marksmanship, physical conditioning and other military subjects.

John McGettigan has joined the Digital Equipment Corporation, Maynard, Mass., as a programmer. . . . *Robert Sarly*, received a Fulbright Scholarship to study in Israel, where he is now engaged in a master's degree program in architecture and town planning. He and his wife Andrea have a lovely apartment on Mount Carmel overlooking Haifa bay.

Mike Telson has a Herty Fellowship at M.I.T. after receiving his masters degree in electrical engineering in February, 1969; he plans to continue working for the doctorate. . . . *Gene Fax* is working for General Oceanology, Inc., of Cambridge, while finishing his masters thesis at M.I.T.

John Mills is teaching at Boston University and living in Boston. . . . *Edie Goldenberg* is studying political science at Stanford University. She writes that she misses Cambridge and environs, particularly the brilliant colors of autumn. She even misses the snow! . . . *Marcel Schwarzkopf* is in the Department of Astronomy at the University of Chicago. . . . *Ernest Anderson* is married, working for I.B.M., and building a thirty-seven-foot ocean-going trimaran. . . . *Larry Banks* is a teaching assistant at M.I.T. and expects to receive his S.M. E. E. in February. . . . *John Toivonen* is studying molecular biology at U.C.L.A. He says "hello" to all the "hackers."

Steve Douglass was named a George F. Baker Scholar at the Harvard Business School. The award is given each year to the top five per cent of the second-year students. . . . *Larry Galpin* recently joined the Fluorocarbons Division of duPont's Plastics Department at the Experimental Station near Wilmington. . . . *Charles Marantz* is working at Lockheed Missiles and Space Company part-time and studying aeronautics and astronautics at Stanford. He should receive his degree in 1970. Motorcycling through the beautiful mountains and hills of northern California occupies much of his spare time.

Joe Levangie received his M.B.A. from Harvard Business School in January as a result of an accelerated eighteen-month continuous program. His job offers include Uncle Sam, but his is hoping to participate in the other half of the industrial military complex. . . . *Robert Trunek* received a promotion to Lieutenant (j.g.) in the Naval Reserve. He works for the Supervisor of Shipbuilding, U.S. Navy, at the Newport News Shipbuilding and Dry Dock Company. . . . *Andrew Egendort* is in a joint Business-Law program at Harvard. Last summer he worked with Ralph Nader on a study of the Federal Trade Commission. Public Broadcasting Laboratory (educational television) presented an hour show about the group's testimony

before the F.T.C.'s Consumer Hearings. *Stanley Engelson* has joined Dow's Midland Division organic chemical pilot plant. . . . *Richard Munkelwitz* is an economist for the Westinghouse Advanced Studies Group in Waltham; he will soon receive his M.B.A. from Columbia. . . . *Gordon DeWitte* is working at E.G.&G. in Bedford as a still-single electrical engineer. He has joined the A.A.U. and plans to compete in indoor track meets throwing the 35 pound weight. . . . In June 1968 *Walt Kuleck* received his S.M. in aeronautics and astronautics from M.I.T. and married Miss Carol S. Edmonson of Katie Gibbs and Wayne, Pa. He is now an aeronautical engineer for the VERTOL-Division of the Boeing Company. . . . Lieutenant *Michael Teter* is presently in Electronic Warfare Officer Training with the U.S.A.F. He hopes to have an F-4 assignment in the Far East after graduation in February. Mike is also working towards his commercial navigators rating from the F.A.A.—*Jim Swanson*, Services Provinciaux, de la Mise en Valeur, Beni-Mellal, Morocco.

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Mike and I are really pleased to discover what an avid audience we have. People even seem to remember which of us wrote the column. That certainly makes the job more pleasant.

Weddings

We have two weddings to report this month. *Eric Sweetman*, who is attending U. of Michigan, married Janet Arey, '71, on February 1, and *Charles Thomas* married Janice McLean, December 6 in North Attleboro. Charles is a grad student in community planning and area development at U. of Rhode Island, and he is also the varsity crew coach there. (He was a coxswain at M.I.T.) Last summer, he worked for Associated Planners of Little Rock, Ark. Charles reports that his current draft status is 1-A, but he's hoping for a bad physical. There is also an engagement to report—*Dan Gruber* to Elaine Leemon, '70. No date has been set for the wedding.

In Cambridge

We've heard from several people who are working in the Cambridge area. *Charles "Corky" Polay* is currently employed as a systems analyst with LTV, hoping to return to Harvard Business School at the pleasure of his draft board. *Herb Finger* is working for NASA in Tech Square, and lives with *Bob Horvitz* and *Dave Kaye*, who are both at Harvard.

Dave Mountain is Chief Engineer in the Medical Engineering Department at Massachusetts General. He is also taking a course at M.I.T. We heard from *Charlotte Babicki*, who is a technical writer with a manpower type company. She is currently working at the I Labs. *Pat Pollack* is also at the I Labs, as an engineer. Pat and Charlotte are roommates.

In more "exotic" places, we have *Don Batchelor*, who is a mathematician for

Sanders Associates in Nashua, N.H., and *Richard Plotnick*, who is working for the Gas Turbine Division of Westinghouse, in Philadelphia. Also, *Ken Morse* is in New York, where he is working as National President of A.I.E.S.E.C. ("no, I haven't changed much," says he). He would welcome calls or visits (889-3970). *Ray Pare* is involved in the music business—producing records, managing groups and doing radio and TV shows. As an undergraduate, Ray was involved with the "Ultimate Spinach." . . . *Roger Gaumond* has been commissioned a 2d Lieutenant in the Air Force upon graduation from OTS at Lackland AFB, Texas. He is being assigned to Edwards AFB, Calif., for duty.

A number of notes have come in from people in school. *Wilson Lamb* is in Ocean Engineering at U. of Rhode Island. . . . *Steve Handel* lists his activities as "draft dodging at the Stony Brook physics department." . . . *Dick Koolish* is a special grad student here at M.I.T. working in the Molecular Beam Lab with Professor King. He is also doing photography for *Technique* and for *Technology Review*. *Ellen Greenberg* is studying linguistics at the U. of Chicago. . . . *Alan Gevins* is a student at the California Institute of Asian Studies, and is also a programmer for San Francisco State College. . . . *John Brasel* is continuing in mathematics at Ohio State. . . . *Richard Handler* is now at Stanford's School of Medicine.

The Alumni Office has just provided us with a card file on the entire Class, giving current reported addresses and other miscellaneous information on course, degree, etc. We will be updating the file as we receive and report information. Right now, we're trying to make the file as accurate as possible. People in our Class who didn't graduate in June are currently not listed, and we're trying to get that straightened out. Also, we've noticed a lot of home addresses listed in default. We've corrected the ones we knew, and are hoping more will be reported soon. From the file, we've found some new activities to report. *Glenn Veeder* and *Dan Harris* are both at Cal Tech; Dan is in the Chemistry Department. . . . *Robert Melanson* is at the U. of Pittsburgh Department of Computational Science. . . . and *Bob Kovsky* and *Paul Langacke* are both at Berkeley.

So much for now. It's really very dull just reporting addresses from the file, and I'm sure you'd like to hear more lively news too, so we hope more of you will take the time to send us a note with a little more detail about your activities.—*Gail* and *Mike Marcus*, Secretaries, Apartment 4H, 60 Wadsworth Street, Cambridge, Mass. 02139

Course Review

Copy for this issue of *Technology Review* was due from your Secretary about January 15. Information reaching him after that date will be reported in the April issue.

V

Charles A. Christy, B.A. University of California 1959, better known as Tony, was at M.I.T. from September 1959, until January 1965. Many of you who were majoring in organic chemistry will remember Barbara (Mrs. Christy) as the typist who got your seminars out on time. Tony was a research assistant in chemistry, was awarded the doctorate in physical chemistry and accepted a position with Philip Hankins & Company, Arlington, Mass. A note at Christmas-time carried the usual Christmas greetings and added, and I quote, "We have had a marvelous year which included a long trip to California (home for us both) this summer. A lovely new house at 22 Pilgrim Drive, Winchester, and Tony has been made vice president." Tony's specialty—molecular and solid state chemistry. He was supervised by Professor Walter Thorson. Congratulations.

Theodore W. Craig, B.S. University of California, Berkeley, June 1962; Ph.D. Organic Chemistry, M.I.T. 1966, has joined Foremost Foods Company as project leader in the Cereal Products Division. The Research & Development Facility is located in Dublin, Calif. Dr. Craig completed the requirements for the doctorate in October 1965 and became a senior research chemist and group leader in the Food Processing Research Department of General Mills in Minneapolis, Minn. From June 1963 through October 1965 he held a National Science Foundation Predoctoral Fellowship. Professor Glenn A. Berchtold was his supervisor.

Richard Dalven, A.B. 1953, a.m. 1954, Columbia University; Ph.D. in physical chemistry M.I.T., September 1968, is currently a member of the technical staff at the R.C.A. Laboratories, Princeton, N.J. His initial contact with R.C.A. was in the summer of 1955 when he was offered and accepted a summer job as a research engineer. Dr. Dalven's present research is mainly in the field of semiconductor physics. His doctoral program at M.I.T. was directed by Professor Carl Garland. For the academic year 1956-1957 he was the recipient of the Union Carbide and Carbon Company Predoctoral Fellowship.

Homer Fay, A.B. Bowdoin College 1949, Ph.D. in analytical chemistry, M.I.T., June 1953, accepted a position on completion of his requirements with the Linde Air Products Company, Tonawanda, N.Y., a unit of Union Carbide Corporation. Union Carbide recently established an electronics division laboratory in San Diego, Calif. Information from Dr. Fay implies a transfer to San Diego where his research is on the electrical and optical properties of synthetic laser crystals and electro-optic crystals—and sailing which is also enjoyed by his wife, their son and daughter.

James K. Heeren, Ph.D. 1960, his wife Carole and their daughter Amy spent a day at the Institute early in January visiting old friends. Jim is an associate professor at Trinity College where he has been on the academic staff since 1962. He has been granted sabbatical leave until the fall of 1969 and they were taking off by air the following day from Boston for Heidelberg, Germany.

Allen H. Keough, B.S. 1950, University of Mass., M.S. 1951, University of N.H., Ph.D. in organic chemistry at M.I.T. in February 1956, was employed by Johnson and Johnson, New Brunswick, N.J. on completion of his requirements for the doctorate but transferred to the Norton Company, Worcester, Mass., in September 1958. In December 1962 he became assistant director of research and development and has now established his own business—Chem-Tech Associates, Consultants to the Chemical and Polymer Specialties Industries, located in Sudbury, Mass. The company will specialize in new products, product improvement and product development in adhesives, sealants, coatings, synthetics, catalysis and absorbants. Dr. Keough's research program at M.I.T. was directed by Dr. Arthur C. Cope.

Kurt W. Kreiselmaier, B.S. North Dakota Agricultural College 1956, Ph.D. in inorganic chemistry June 1961, has recently been appointed technical director of Graham Magnetic, Inc., Graham, Texas. Prior to the completion of his requirements he was interviewed by Gordon Peattie, Ph.D. M.I.T. 1952, and since graduation has associated with Texas Instruments Inc., at their Central Re-

search Laboratory in Dallas, Texas. Kurt made the trip, accepted their offer and made his home in Dallas. Graham Magnetic Inc., is the only Texas producer of precision magnetic computer tape. Dr. Kreiselmaier was a teaching assistant at M.I.T. and a research assistant with Professor Charles Coryell who directed his research.

Walter Moreland, B.S. 1948; M.S. 1950, University of New Hampshire, has been named Director of Research in Medical Chemistry in the Development Laboratories of Chas. Pfizer and Company, Groton, Conn. Walter served in the U.S. Army from 1944 to 1946, was assigned to the University of Chicago to study Japanese and acted as interpreter for the Army of Occupation in Japan. In his final year as a candidate for the doctorate in chemistry at M.I.T. he was awarded an Atomic Energy Commission Fellowship which he held from September 1951 through June 1952 when he completed his requirements and accepted a position with Pfizer.

John Charles Morrow, III, was born in North Carolina on September 20, 1924 and graduated from the University of North Carolina with a B.S. in 1944. He served in the U.S. Navy as a Lieutenant j.g. (American Caribbean, Asiatic and Pacific waters) from August 1944 to September 1946. He was awarded the doctorate in physical chemistry in September 1949; accepted an assistant professorship at the University of North Carolina in September 1949, and on July 1, 1968 relinquished the post of Dean of the College of Arts and Sciences to become Provost of his alma mater. He still retains his position as Professor of Chemistry. Dr. Morrow was the recipient of the Allied Chemical and Dye Predoctoral Fellowship for the academic year 1948-1949. His research was directed by Professor Clark Stephenson.

James D. Willett, B.A. University of California at Berkeley, 1959; Ph.D. in organic chemistry, M.I.T., September 1965, has accepted an assistant professorship at the University of Idaho. After completion of his requirements, and until his appointment at Idaho, he did postdoctoral research with Professor van Tamelen at Stanford University, Calif. While at M.I.T.

he served as a teaching fellow, held the American Chicle Company Predoctoral Fellowship, 1962-1963, the E. B. Hershberg Predoctoral Fellowship, 1963-1964 and a National Institute of Health Predoctoral Fellowship 1964-1965. His research was directed by Professor Glenn A. Berchtold.—*L. F. Hamilton, Correspondent, M.I.T., 4-254, Cambridge, Mass. 02139*

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William H. Huggins, Sc.D.'53, is Westinghouse Professor of Electrical Engineering at Johns Hopkins University. His teaching and research activities are in the fields of computer sciences, communications engineering and signal theory. During the Second World War he worked with Dr. F. E. Terman at the Radio Research Laboratory at Harvard University where his analyses contributed to the solution of difficult klystron oscillator problems. Prior to joining the electrical engineering department at Johns Hopkins in 1954, he was a Civilian Engineer at the Air Force Cambridge Research Center.

He has received the Browder J. Thompson Award of the Institute of Radio Engineers (now IEEE), the Air Force Decoration for Exceptional Civilian Service and the Lindback Award for Distinguished Teaching. Also at Johns Hopkins University is **Moise H. Goldstein, Jr., S.M.'51, Sc.D.'57**, who is in charge of the program in biomedical engineering.

Levin W. Foster, S.M.'30, is Technology Utilization Officer for the Small Business Administration with his office in the John F. Kennedy Building, Government Center, Boston. In the September 1968 issue of *New England Business* he describes how this agency makes available to small business the vast store of Government owned technology in a useful form. The small business man is made aware of these services through the publication of a small brochure, "Opportunities from New Technology." From a list of 163 categories the small firm selects those of special interest and is then supplied with all abstracts pertinent to these categories. The Utilization Officer provides counseling in the final stages of this service. Mr. Foster was

with the General Electric Company for more than 30 years as engineer and manager before joining SBA in 1963.

Raymond A. Nash, Jr., S.M.'61, is a member of the Systems Analysis Group of Dynamics Research Corporation in Stoneham, Mass., where he has recently been studying error analyses on internal navigation systems of ships. Before joining Dynamics Research in 1966 he was with TRW Systems in Redondo Beach, Calif. where he worked on the analysis and synthesis of spacecraft attitude control systems. As an undergraduate student, he was in the electrical engineering physics option at Princeton University. He received the Ph.D. degree in engineering and applied science from Yale University in 1966.

Professors **Hugh H. Skilling, S.M.'30**, **James B. Angell, VI-A S.B. and S.M. '44, Sc.D.'52**, and **James D. Meindl** of Stanford University have authored an article in the November, 1968 *I.E.E.E. Student Journal* entitled "The World of an Educator." Responsibilities and opportunities of the educator in a research-oriented university are presented to the student attractively and lucidly. Points stressed are:

1. The educator must keep himself at the forefront of knowledge and applications.
2. He opens vistas of possible achievement to his students.
3. He chooses a research area for himself and pursues it vigorously. Professional stature comes through the publication of his researches, the writing of textbooks and association with other investigators.
5. According to his abilities and tastes, the educator will contribute to the administrative activities of his organization.
6. He should make his interests and accomplishments visible to the industrial and educational communities, thus enhancing his advancement into positions of increased responsibility and service.

Professor Skilling received the Ph.D. degree at Stanford in 1931 and is noted for clear and imaginative exposition in his several textbooks. He has lectured at many universities including M.I.T. and Cambridge University. We shall watch with interest for his newest book titled *Do You Teach?* Professor Angell is Director of Stanford's Solid-State Electronics Laboratory. He is a member of the Army Scientific Advisory Panel and the

Army Electronics Advisory Group. In addition to his professional activities, he is an organist and carillonneur.

Robert P. Hunt, S.M.'60, E.E.'62, Ph.D.'64, with other members of the research staff of Ampex Corporation, Redwood City, Calif., has developed a new method of recording information on a very thin magnetic film. The method uses a small spot of a focused laser beam to record and later to read out the information. As many as 10 million magnetic bits can be written in each square inch of magnetic film. The storage density is limited only by the optical quality of the lenses used. Since only the laser beam comes in contact with the surface during the process, the usual wear problems of normal magnetic recording at high information densities are eliminated. Dr. Hunt did undergraduate work in physics and mathematics at Ohio Wesleyan University, receiving the B.A. degree in 1958. While at M.I.T. he held an assistantship in the Laboratory for Insulation Research where his thesis research on the properties of certain garnets was supervised by Professor D. J. Epstein.

Shintaro Asano, S.M.'61, formed his own organization, the Shintron Company, in 1963 and since 1965 has given his full time to its development. Shintron now has three divisions; the Facsimile Division dealing in facsimile and wire-photo equipment; the Video Products Division, which develops and manufactures television equipment, camera-to-video recorders, and cameras; and the Medical Division which makes X-ray film magnifiers. Mr. Asano came to M.I.T. as a Fulbright Scholar in 1959 from Waseda University in Japan and, after his graduate work in image processing, was employed by the Smithsonian Institution in Cambridge in the design of satellites. From 1962 to 1965 he was with Adcom in Cambridge.

Dr. John W. Carr III, S.M.'49, has been appointed Chairman of University of Pennsylvania's new graduate group in Computer and Information Science. Although a curriculum in this field has existed at the University since 1959 under the aegis of the graduate group in electrical engineering, the number of graduate students (235 this year) showed clearly



R. C. Quick



Richard H. Fuller

the need for an integrated curriculum and a corresponding research program. Pennsylvania's ENIAC and M.I.T.'s Whirlwind I in the middle 40's were pioneers in the field of large-scale electronic digital computers.

Richard H. Fuller, S.M.'54, has been appointed Director of Research for Sperry Rand Corporation's UNIVAC Federal Systems Division, in St. Paul, Minn. He was formerly Director of Advanced Technology for the Librascope Group of General Precision, Glendale, Calif. In 1963 he received his doctorate in computer sciences from the University of California at Los Angeles, where in recent years he has lectured in engineering. Dr. Fuller holds 12 patents in the general area of computer circuits, logic and organization, and has authored 10 technical papers for presentation at various conferences.

Raymond C. Quick, S.M.'50, has been named Manager of the Prototype Fabrication Center at Raytheon Company's Missile Systems Division Laboratories, Bedford, Mass. He came to Raytheon from the New York Airbrake Company where he had served as General Manager of the Feedback Controls Division, Natick, Mass., and as a Vice President for Engineering. Mr. Quick entered M.I.T. in 1949 for the study of automatic control following an honors degree in electrical engineering at Canterbury University College, Christchurch, New Zealand.

The following reports have been received by the *Technology Review*: **Admiral Alfred G. Ward**, S.M.'40, writes, "I have retired from the Navy and am now Headmaster of the Severn School at Severna Park, Md." **Giles F. Crimi**, S.M.'64, joined the technical staff of the Washington Division of the General Research Corporation in April 1968. Captain **George C. Fleming**, S.M.'56, has retired after 26 years of active duty in the United States Coast Guard, recently as Chief, Electronics Engineering Division. He is now employed as Systems Engineer for Pan American World Airways, Aerospace Services Division on the Eastern Test Range. **Robert A. Kelley**, S.M., '49, became Manager of the Philadelphia Tele-Computer Center of the Westinghouse Electric Corporation. **James E. Steelman**, S.M.'62,

writes, "I received my Ph.D. from the University of New Mexico in June. My wife and I celebrated with a trip to Europe. I am now on the faculty at New Mexico State University." Mrs. **Sylvia L. Waller**, S.M.'47, writes, "Completing decade with Institute of Defense Analysis, Washington D.C., in the Systems Evaluation Division. Two grown-up daughters in college. All well and happy. Glad to hear from classmates at any time. We are all active in the Washington D.C. M.I.T. Alumni Club." **Chen-Fong Hsu**, S.M.'35 is Vice President, Taiwan Power Company, now on temporary assignment as Adviser to a power company in Nigeria. He was formerly Director, Republic of China Power Mission to Vietnam. **William R. Hewlett**, S.M.'36, President of Hewlett-Packard Company, has assumed the duties of Chief Executive Officer, as Mr. **David Packard**, formerly in that position, left to take up his new appointment as Deputy Secretary of Defense in the Nixon Administration.—**Karl L. Wildes**, Correspondent, Room 10-303A, M.I.T., Cambridge, Mass. 02139

XIII-A

Your Correspondent apologizes for the recent gap in XIII-A news and promises to remain current from here on. In July, 1968, Captain **Dean A. Horn**, USN, Nav. E.'49, relieved **Bob Stark**, S.M.'48, as Professor of Naval Construction and Professor of Naval Science at M.I.T. Bob retired from active duty and is now working as Executive Assistant to the President, M. Rosenblatt & Son, Inc., Naval Architects and Marine Engineers, New York City.

Several alumni received important honors in recent months: Rear Admiral **Frank C. Jones**, USN S.M.'43 was elected President of the American Society of Naval Engineers. Since January 1967, Frank has been assigned as the Vice Commander, Naval Ship Systems Command, Washington, D.C.; Captain **Wallace H. Garrett**, USN, S.M.'46, retired from the Navy in August and was awarded the Legion of Merit. The award was given for Hank's outstanding performance as DX Project Manager for the 18 months prior to his retirement. Present with Hank were five

of his six lovely daughters; **John J. McMullen**, S.M.'45, recently was elected President and Chairman of the Board of United States Lines Company and United States Lines, Inc. In addition, John was chosen by the Robert L. Hague Post to receive its Distinguished Service Medal Citation at the Annual Guard of Honor Dinner-Dance last November. Captain **Robert C. Gooding**, USN, S.M.'46, was awarded the Legion of Merit for meritorious service as Technical Director, Strategic Systems Project Office. Bob has since taken command of the Boston Naval Shipyard where he relieved **Stuart Jones**, S.M.'46, who retired from the Navy and is now attending the University of Pittsburgh, studying Management; **Robert H. Slaughter, Jr.**, S.M.'48, has been appointed Vice President of Ingalls Shipbuilding Division of Litton Systems, Inc. Bob has been manager of Ingalls' Nuclear Propulsion Program since 1957.

Captain **Bill Searle**, USN, Nav. E.'52, was the author of an article on salvage of *USS Bache* which appeared in a recent issue of the *Naval Engineers Journal*. Bill is currently Supervisor of Salvage in the Naval Ship Systems Command. **Wendell Kraft**, S.M.'29, recently retired from his "second career" as Assistant to the President and Associate Professor of Engineering at Trinity College. **Louis H. Roddis**, S.M.'44, Chairman of the Board, Pennsylvania Electric Co., participated in a panel discussion on "The Increasing Importance of the Breeder Program" in an American Power Conference Symposium.

Captain **Ries Heller**, USN, Sc.D.'50, retired from the Navy and is now professor in the mechanical engineering department of Catholic University in Washington, D.C. **Randy Zelov**, Nav. E.'56, is currently Director of Engineering, Viz Manufacturing Co., Philadelphia, moulders of custom plastics and electromechanical assemblies. **Kenneth S. Brown**, S.M.'44, is working on the Surface Effect Ship Program for Electric Boat Division of General Dynamics. Captain **Ted Fick**, USN, Nav. E., '52, left Boston after five years at the Naval Shipyard and is now Commanding Officer, Naval Radiological Defense Laboratory at San Francisco. Captain **Charles Payne**, USN, S.M.'48, is now the Commander of the Charleston Naval

Shipyard, Charleston, S.C.—*Robert Stark*, Correspondent, M. Rosenblatt & Son, Inc., 350 Broadway, New York, N.Y. 10013

XVI

Post-war assignments took him all over, from air stations to the War College to the Pentagon, and in 1959 to command of the USS Kearsarge. The following year saw his selection as Rear Admiral, and the next month he took over command of Carrier Division Seventeen, and later, Division Six. In 1966 Admiral Townsend was designated Commander, Naval Air Systems Command, whose responsibilities include the entire spectrum of development, production, and support of all naval and marine aircraft and air weapons systems. That's a rather all-inclusive and awesome charge.

Captain J. B. Padgett, Jr., USN, previously skipper of a Polaris submarine, is now back in Washington; but let Jack tell it as it was then. "Since leaving M.I.T. the second time in 1961 [he got his S.M. in 1954], I have enjoyed a delightful year's study at the Naval War College, Newport, some two years as ComSubLant's New Development Officer in New London, two years at "Mecca" (some call it Washington) in BuWeps as the Subroc Project Manager, then back to the Polaris business as Commanding Officer USS Holland (AS 32). I'm thoroughly enjoying this tour, having relieved in Rota, Spain, then brought the ship back to Charleston where we are now busily engaged in keeping these SSBN's on the line. The family, of course, is with me here and we like the quaint old city of Charleston. It would appear that shortly I'll be heading back to the source of it all—somewhere in Washington."

Harry D. Felsenthal, Jr., '57, must have some kind of an intercollegiate first. Look at this lineup of colleges he has attended at one time or another: Pomona, Dartmouth, U. of San Francisco, U.S. Naval Academy, Harvard, M.I.T., and UCLA, not to mention a lengthy list of NRO correspondence courses. His activities have also varied con-

siderably, ranging from weather watching on top of Mt. Washington to submarine duty in the Pacific with eight war patrols. Since the war, except for a short time with Raytheon and a year's sojourn with us, Harry has been at the Naval Missile Center at Point Mugu, Calif., primarily as an electronic engineer. Along the way he has authored a number of papers with lengthy titles and found time to be president of Toastmasters International, Pacific Missile Club. A great deal more could be written, but this brief accounting gives evidence that Harry Felsenthal is a man of broad interests and accomplishments.

From *Bengt Schmidtbauer*, '65: "I am employed at the Gothenburg Electronics Laboratory of the SAAB Company. My work is primarily concerned with Systems Analysis in the Guidance and Control field, mainly from a theoretical point of view." From Lt. Gen. *Leighton I. Davis*, '41, USAF: "Currently I am Commander, National Range Division, Air Force Systems Command, and Department of Defense Manager for Manned Space Flight Support Operations located at Andrews Air Force Base, Washington, D.C." Since then he has become Commandant of the Industrial College of the Armed Forces, and this past year retired from the Air Force. He is currently with Lockheed as Special Assistant to the Vice President for Safety (but I am not sure of the exact title of his last position).

After leaving us in 1956 with his newly awarded masters degree, Captain *Bradford C. Healy*, USAF, went to the Missile Development Center at Holloman AFB. He was there for three years "and certainly used my M.I.T. training", then on to the Air Force Academy for another three year tour. Here Major Healy taught math and astronautics, presumably still finding some use for his M.I.T. training.

He next went to Washington with the Hq Air Force Systems Command as a Systems Officer in the office of the Deputy Commander for Space. This assignment was a lengthy one, five years, and in 1967 Lieutenant Colonel Healy was reassigned to SAMSO (Space and Missile Systems Organization in Los Angeles).



Oliver C. Boileau, Jr., Sloan Fellow '64

Sloan

Oliver C. Boileau, Jr., '64, became Vice President-General Manager of The Boeing Company's Missile Division in December, 1968. He is responsible for the company's missile product line and its major programs, the Minuteman Intercontinental Ballistic Missile and the AGM 69-A short-range attack missile (SRAM). Mr. Boileau has been associated with Boeing's missile programs since 1958. . . . *A. Bruce Burns*, '62, is Vice President-production with the Union Carbide Chemicals and plastics divisions. He is located in the New York office. . . . *David K. Easlick*, '55, Vice President, operations, of Indiana Bell Telephone Co., was elected a director. . . . *Robert S. Ames*, '54, is a Vice President, Textron, Inc., Providence, R.I. *William S. Nochisaki*, '60, has succeeded Mr. Ames as Vice President-manufacturing, Bell Aerosystems Co., a Textron company, Buffalo, N.Y.; and *Joseph R. Piselli*, '63, is now Vice President-marketing also at Bell Aerosystems.

Wayne H. Burt, '58, has assumed the newly created post of Assistant General Manager, San Manuel Division, Magma Copper Co. . . . *Goff Smith*, '53, Executive Vice President of Amsted Industries, Inc., Chicago, has been elected a Director. . . . *W. L. Button, Jr.*, '60, is General Manager of Lever Brothers' manufacturing division. . . . *Patrick J. Coletta* has been appointed plant manager at the G.M. Assembly division of General Motors Corporation, at Kansas City, Kan. . . . *Russell C. Youngdahl*, '63, is this year's President of the University of Michigan Club of Jackson, Mich.

A certificate of recognition was awarded to *Edward G. Koepnick*, '65, by the A.S.M.E.'s executive committee of the biomechanical and human factors division at the division's Washington, D.C., conference. He was co-author of *C-5A Environmental Control System Development* which was judged the paper which "most advanced our branch of the mechanical engineering profession."

Thornton A. Wilson, '53, was elected a Fellow of the American Institute of Aeronautics and Astronautics in 1968.



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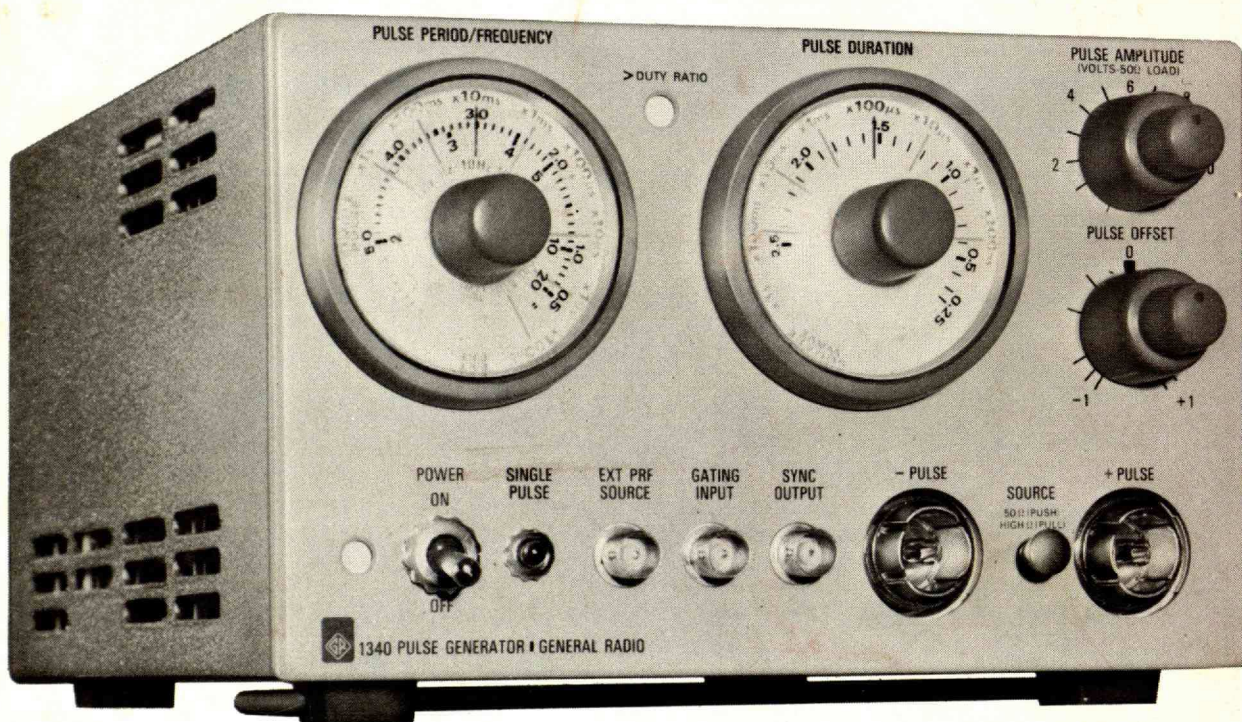
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